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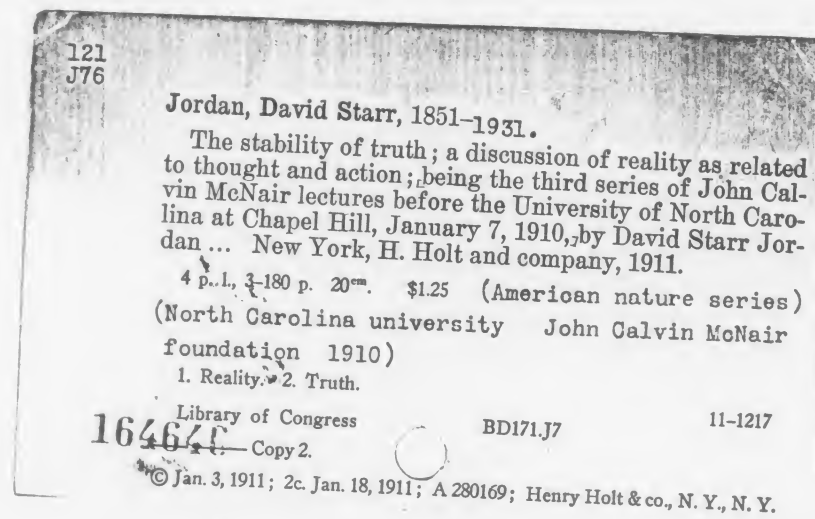
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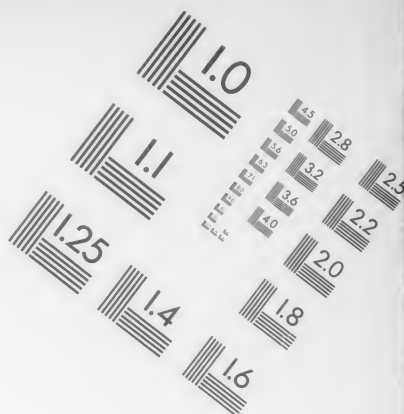
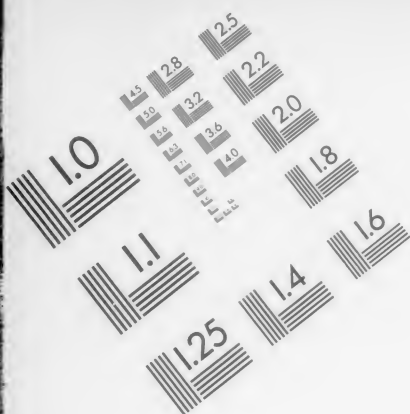


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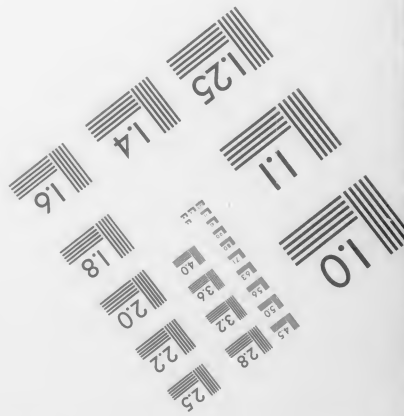
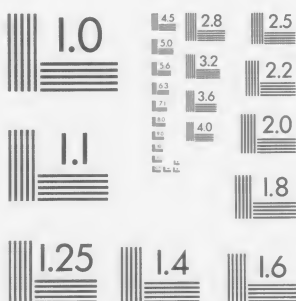
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THE STABILITY OF TRUTH

American Nature Series

Group VI. The Philosophy of Nature. Edited by V. L. Kel'ce;

THE
STABILITY OF TRUTH

A DISCUSSION OF REALITY AS RELATED
TO THOUGHT AND ACTION

BY

DAVID STARR JORDAN

President of Stanford University

"Veritatis laus omnis in actione consistit."—CICERO

"Al frier de los huevos; se verá."—CERVANTES



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1911

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EDITOR'S PREFACE

THE generalizations and principles of science, the significance of scientific facts, the consequences of recognizing and adopting in our daily life the knowledge of science: these are the subjects of this series of books, to be called the Philosophy of Nature Series.

The science which will be most in evidence in these books is the science of living things, biology. And it is the application of the scientific knowledge of living things in general to the conduct of human life in particular which will be the subject most conspicuous in the list of titles of the books of the series.

This first book, then, a robust treatment of science in life, by a robust exponent of the life scientific, should be a most excellent introduction to the Series.

V. L. K.

STANFORD UNIVERSITY
April, 1911

PREFACE

THIS little book represents the substance of a course of lectures delivered on the John Calvin McNair Foundation, in the University of North Carolina, at Chapel Hill, in January, 1910, at the invitation of President Francis P. Venable. By the provisions of the will of Mr. McNair, fifty years ago, the University authorities were directed, from time to time, to "employ some able scientific gentleman to deliver before the students then in attendance at the University a course of lectures, the object of which lectures shall be to show the mutual bearing of science and theology upon each other, and to prove the existence (so far as may be) of God from Nature." This book treats especially of the relation of realities to human experience and to human conduct.

The writer is under special obligations to his colleague, Professor Henry Waldgrave Stuart, for trenchant criticisms, by which he has tried to profit.

D. S. J.

Stanford University, California,
November 16, 1910.

I

REALITY AND SCIENCE

"Nous sommes des hommes et non pas des dieux; nous ne savons le tout de rien, mais nous savons quelque chose. C'est peu, sans doute, mais ce peu suffit."—GEORGE FONSEGRIVE

ONCE walked in a garden with a little girl, to whom I told James Whitcomb Riley's story of the "goblins that get you if you don't watch out," an uncanny freak of the imagination supposed to be especially attractive to children. "But there isn't any such thing as a goblin," said the practical little girl, "and there isn't ever going to be any such thing." In a spirit of philosophic doubt I said to her, "Maybe there isn't any such a thing as anything."

"Yes, there is," she said, as she looked about the garden for unquestioned reality. "Yes, there is such a thing as anything. There is such a thing as a squash."

And in this conclusion of the little girl, the reality of the objective world, the integrity of science, the sanity of man are alike bound up. The distinction between objective and subjective, between reality of perception and illusion of nerve disorder, between

fact and dream, between presence and memory, is fundamental in human psychology—is essential in human conduct.

- ✓ The purpose of this book is to set forth the doctrine that the final test of truth is found in trusting our lives to it. Truth is livable, while error is not, and the difference appears through the strain of the conduct of life. Science is human experience tested and set in order. The primal impulse as well
- ✓ as the final purpose of science is the conduct of life. It is held that science cannot grasp ultimate truths, that is, it cannot grasp any truth in final or absolute completeness. But science may grasp certain relations of truth and certain phases of reality and may state these in terms of previous human experience. Such versions or transcripts of reality are truth, and they represent actual verity so far as they go.

Incidentally it is held that pure science cannot be separated from applied science, or knowledge in action, in which science finds its verification; that philosophy is an outgrowth of science—the logic or mathematics of human experience, and, finally, that in all matters concerning human conduct science furnishes the final guide, or, at least, that any guide to thought and action which has proved to be safe becomes by that fact a part of science. Right action

- ✓ is the final purpose of science, and in like fashion and in the same degree the acquisition of truth is the crowning glory of human endeavor.

It is claimed that there exists a parallelism or cor-

relation between the actual character of objects in nature, and the impressions these objects make on the nervous system of man and of other animals. The impression is not the object, and it is the impression, not the thing itself, which man sees or feels, but object and impression run the same course. The one is the inevitable effect of the other, as impressed on human consciousness.

The term *reality* is used in psychology to designate impressions made on the mind or on the nerve center by the impact of an external stimulus. A reality in the mind has its origin in an actual object or influence outside the nerve center or sensorium receiving it. It is an objective impression as distinguished from a subjective condition. Subjective impressions, that is, appearance of reality seen by the "mind's eye" only, may be illusions. An illusion is at bottom usually a fading memory. It is a continuance of a reality in the nerve center, after the source of the reality has passed away. An incorrect interpretation of an actual reality is known as a delusion.

Illusions aside, the normal impression made by a normal stimulus on a normal mind is a reality. A reality within measures a truth outside.

The degree of correspondence or of correlation between a reality of our minds and the actualities of the thing in itself ("das Ding an sich," whatever that may be) is our measure of truth. That our "realities" or impressions of external things have

a degree of objective truth is shown by their coincidence with impressions derived second-hand from scientific instruments of precision. Thus the camera, a chemico-mechanical eye, devised by man, reproduces forms as shown by reflection of light. From the photograph properly adjusted we can receive nerve impressions or new realities virtually identical with those we derive from the thing by itself. In the same fashion the phonograph, a mechanical ear, records sound vibrations just as the ear does. These vibrations given out second-hand are indistinguishable from the original, except through the imperfection of the materials used in recording, as compared with the ear-drum itself. These instruments show not only that the objects about us maintain a constancy of behavior in relation to us and to our mechanical devices, but that they influence our devices in some degree in the same fashion in which they influence us. The common element in these processes is an element of actual truth. When a truth is segregated as a proposition it must be stated in terms of human experience. It is often claimed that the real nature of the thing in itself is so distant from our experiences, so absolutely inscrutable, incomprehensible, and unknowable, that we can have no truth whatever in regard to it. All we have is our impression of certain effects on our consciousness. We assume, without real proof, it is said, that our various sensations are transcripts of any actuality whatever, and,

furthermore, that we do not know that our sense-impressions accord in any degree with impressions which may be made on other types of consciousness. It is further asserted that our own sense-impressions, whatever they may be, are in every case vitiated (or vitalized) by personal and individual habits of inference and reasoning. All these qualities of personality, it is claimed, lead us, if possible, still further from the actual character of the actual thing in itself.

The answer to this is found in that fact that men and animals are guided by their realities. They live by truth. That they move safely implies safe guidance, the power to "size up the situation" about them with substantial accuracy, so far as it concerns themselves. Were it not for this power the race of men could never have maintained itself. The sense-organs of every animal are so constructed that its realities are adequate to its needs. The need is not that of a "copy or transcript of nature, but accuracy as prompting fruitful attack or exploitation." For the truth in dealing with external things is not primarily knowledge of the things themselves, but rather of their relation to each other and to us. Effective action depends on ability to "size up a situation." It is the situation or correlation of objects which impresses us rather than the things in themselves.

The nervous system arose, in the first place, as a necessity in relation to the power of locomotion.

To move from place to place makes direction of motion a vital need. This direction is given through the nervous system. The most distinctive trait of the animal kingdom is its power to move. Its most distinctive group of organs is the nerve-system. The functions of the nervous system collectively constitute the Mind, using that term in the large sense. If animals are to move about, they must move about safely and surely. Their senses give safety, for they give truth; not absolute nor ultimate truth, nor truth of some unknown category, but such degree of reality as is necessary for the preservation and development of life.

✓ Humanly speaking, and there is no other way for us to try to speak, there is no absolute truth. That is, we have no truth that is true from all standpoints at once, nor from a general standpoint at large, a ✓ standpoint which is not that of any particular person, place, or time. That which I now hold to be true about any given thing does not pretend to be a full copy of reality, nor to be logically harmonizable with all truth, present or to come. It claims, or I may claim for it, that if, as I understand it, it be acted upon, it will be followed by the results which I expect. To say that a certain proposition is true to me does not affirm that it is true from an imaginary standpoint of absolute truth, nor does it involve an imaginary or absolute completeness of knowledge.

In the human race more truth is demanded than

with the lower animals, because man's powers of motion and locomotion are far more diversified. Man needs truth better defined as well as truths of a higher order than those which suffice for the needs of other animals. These new truths must answer to the new interests expressed through his more varied powers of action. He must have more wide-reaching correspondence between his impressions of the environment and the environment itself as it exists in relation to him. These impressions and conjectures, the collective experience of many men tested and set in order, constitute science. With the advance of science man has invented an immense variety of devices, instruments of precision, by which impressions too subtle for the ordinary senses may, with relative accuracy, be also tested, measured, and set in order. It is by means of experience, personal and collective, that the human race maintains itself on the earth. The experience concerns itself chiefly with the relations of objects, rather than with their ultimate constitution or their intimate nature. It gives the truth actually needed in actual life, and it furnishes the means for the acquisition of more complete conceptions whenever in the intricacies of life such better knowledge is needed. That we do not know the chemical composition of a rock or a jewel in no wise prevents us from using the one as a weapon, the other as an ornament. If we are dealing with an object as such, a drug or an ore, for example, the chemical composition may be all-

important. The experience of the race gives us the means of finding out this composition. But the fact that we may not know the chemical composition of a rock does not in any degree darken or impeach such knowledge of it as we already have. It does not challenge its fitness for the particular use for which we have chosen it. The fact that we have no absolutely complete knowledge of anything does not demonstrate the unreality of external things. It does not even throw doubt on any part of the actual knowledge we possess. We may see one side of a mountain peak. We may become familiar with its ridges and valleys and all the details of its surface without knowing what minerals may be concealed within, or what forms the other side of the peak may assume. We may not know whether it is really a peak or the end of a long ridge. And the acquisition of this additional knowledge would give us no clearer vision of the part we see. Conversely, the absence of further knowledge does not darken the actual outlook. We know what we know; it is truth so far as it goes. We may safely trust it so far as our knowledge reaches. The knowledge we possess is not knowledge of the object "at large," but of the object in its relations to us.

Our view of the mountain may be wholly adequate if we mean merely to climb its side. If we wish to exploit its recesses for gold ore, we must seek further truth, and by the recognized processes of science. We must have had experience with the

indications of gold deposits, or we must seek the services of some one who has had or has collated the results of such experience.

The power to sum up the truth arising from ordinary sense-impressions derived from realities we call common sense. Science involves common sense, but its operations are continued beyond the obvious into the hidden complexities of truth. By a knowledge of these complexities endeavors similarly complex may be carried out with success. Such success, other things being equal, is in proportion to the exactness of our knowledge, the degree in which our conceptions are transcripts of reality, and the courage with which we use our knowledge in our actual operations.

The final test of truth is, then, its "livableness," the degree to which we may trust our lives to it. Just as we may trust our lives so can we trust that for which life is valuable, our aims, purposes, and hopes singly, one by one, or grouped together in systems. Livableness seems to represent our final test rather than "workableness," the word more often used in this connection. An idea may be "workable" because the people concerned are willing to try to use it in their work. That people are willing to accept it as a basis for action is not proof that the conception itself is true. That one man or ten thousand or ten million men find a dogma acceptable does not argue for its soundness unless these men have one and all successfully translated it into ac-

tion. If it cannot be tested by action in some fashion or other, it is not a truth. A truth, to be our truth, must have some relation to experiment, some relevance in human affairs. A vast proportion, probably a majority of the Aryan race, accepts the doctrine of Reincarnation. It is a doctrine which can in no way be tested by action or worked out in terms of endeavor. In so far as science or co-ordinated human experience can touch it, it can make no use of it. That you or I or a hundred millions of men in India find it satisfying or acceptable or apparently "workable" is no argument in its favor. It has no standing in the court of realities, as it rests on no phase of human experience.

If a doctrine is livable we can trust our lives to it. This involves the idea of personal safety or of race security. It may not be at once applied to any given proposition. It may be applied to the process by which our knowledge is gained, as well as to the proposition itself. This is the final test, the test of the long run, for no doctrine can find its full test in the lifetime of an individual. If it is true, one man, or generation of men, can depend upon it, or upon the methods by which the doctrine is developed. We do not yet know what electricity really is. We have large experience in what it will do, and in the changing relations of objects produced by changes in electrical conditions. This knowledge tested and set in order constitutes electrical science. To this we trust our lives every day, those of us

who travel by rail at the mercy of the block system and the train despatcher. If this knowledge were not true so far as it goes, and so far as it concerns us, the error involved in it would prove fatal, not at once necessarily, nor to all of us, but in the long run to the race, to all who trust to the methods by which this knowledge was obtained. This error might not involve actual race extinction, at least not within an appreciable time. But it would involve destruction in proportion to the importance of the error. For the rest we might expect that life would be on a lower plane than would be possible with more exact knowledge and the courage and intellect to make use of it.

In no field has science yet reached finality. It sees some things very clearly, but the unknown lies about on every side, a trackless wilderness yet to be cleared and fitted for human habitation.

To some philosophers, this vastness of the unknown is a matter for despair rather than hope. There is so much unknown, so much outside of human experience, that our acquisition and endeavor count as next to nothing, while for ultimate truth of any sort we must appeal to some other source of knowledge. It is claimed that our sense-impressions, the realities of psychology, are infinitely removed from the actuality of the thing in itself. Being infinitely remote, they give us no conception of any real thing. At the most, and that is not much, we have only impression of rela-

tions, perception of changes, the flight of shadows in environment, and that therefore, from fact and nature, "we know not anything," "we only trust," and, so far as the external world is concerned, we must let it go at that. Only the seer can know the truth, and for this he must look within, and within only.

To this we oppose our robust common sense, the everyday experience of any man who tries to do anything. He finds his efforts effective in proportion to his own trust in realities, and in proportion to his own efforts to make use of the experience of his race. Knowledge is power. That is, knowledge enables effort to become effectiveness. We may know but little, but that little may be exact. The safety and the success of our efforts attest the clearness of our knowledge, so far as it goes.

An apple is a very familiar object. It is one of the things which we know with considerable accuracy and fullness of detail. That is what we mean by calling it familiar. Much effort has been expended to find out what constitutes the apple after we have, in our minds, removed all its attributes. What is left after the redness, sourness, size, weight, substance of the apple have one by one been taken away? Naturally only the apple is left. But what is the apple without these attributes? Only the attributes appeal to normal human experience. The apple in itself is nothing more than these experiences, with the addition of possible appeals to other

experiences less tangible than these. We can never know the complete truth about the apple, but what we do know may be just as real, just as true, as though we knew it all. It is the truth as far as it goes, and the truth, man-truth, in our possession, is just as true as though it were God's truth, which, indeed, it is as well.

Our sense of vision shows us the moon. We recognize its form, the outlines of its shadowed districts, its luster as illumined by the sun. All this is true so far as it goes, just as true as though we were able to touch it, to see its hidden further hemisphere, or to look down into the craters of its volcanoes. To do these things would add knowledge. It would not change its nature. What we have is truth; the rest is merely the truth we do not have, and which, may be, we do not want. Too much truth, more than we can assimilate, may confuse action or render it abortive. We cannot use truth much before we are to ask for it. To utilize it we must assimilate it with the truth already held. We must conceive it in terms of our experience. With scientific methods, tested and verified by human experience, we may determine the size of the moon, knowing the length of two sides and the size of the included angle. Or, knowing two angles and the length of the included side, we may determine its distance from the earth. Or, with the instruments of science, we may gaze into its craters and calculate the height of its crests from the shadows thrown

by the sunlight which strikes them on the edge. All this and everything else which the astronomer can teach of moon and star, so long as it rests on human experience and is adequately tested and set in order, is truth. It is not the whole truth, for human experience works at long range, with the smallest as well as the greatest of objects, but it is truth so far as it goes. Each truth we attain suggests the existence of other truths, more or less susceptible of being tested. There are always groups of realities not perfectly defined. Such truths may belong to that fringe or penumbra of science in which science merges into philosophy.

The men who do things have known what they are doing. Men must have sized up a complex situation pretty well to have laid the Atlantic cable, to have painted the "Last Supper," to have drawn up the Declaration of Independence, to have spoken the "Lord's Prayer." The chemist-biologist, with the infinitely little, or the astronomer, with the infinitely vast, the engineer, with his forces and resistances, the statesman, with his millions of individual units; all these are in a degree masters of their environment, else they could not be masterful in dealing with it. Science is power, because power depends on knowledge. But science is power to the degree that it is truth, to the extent that it represents an effective co-ordination of the results of genuine human experience.

The present writer just now is dealing, or thinks

that he is dealing, with the statutes which govern fishing in the international boundary waters of the United States and Canada. He thinks that it is true that he exists ("I think, therefore I am"), and that he is the representative in this matter of eighty millions or more of similar individuals or mental and physical units, in a nation called the United States. He has never counted these units, but he thinks that he has met many of them, and he takes the work of some of them, as recorded by printed signs, for the rest. As to the nation called the United States, he thinks that he has seen much of it, and that he can imagine the rest. The parts of it as seen by his neighbors seem to impress them much as they do him. For all practical purposes he finds he can trust their statements. It is workable to do so. Or, at least, it seems to seem so to him. He thinks that he has traveled the long extent of this long boundary, and all the way he thinks he finds people whose impression of every detail coincides, so far as he can determine, substantially with his own. He can guide himself along the road by the maps they have published. He can time himself by the time-tables of their railways and steamships, and he veritably believes that his ideas of these railways and steamships, being substantially those of their builders, are fairly near the truth. He does not see how, for any practical purpose, any one could get from these machines any important truth which was unknown to the men who planned and built them.

In like fashion he thinks that he knows that the Great Lakes exist, that Lake Superior is the largest and Lake Erie the richest in life. He thinks that he knows something of why this is so. He deals with what he and most men regard as fishes, useful to man because men suppose that they can use them as food. These fishes have each individually an anatomical structure, with what seems to be complex physiological action. Of these fishes he thinks, and his associates agree with him, there are many kinds in these lakes, those of each kind varying somewhat, but substantially alike, and those of all the kinds having much in common also, but separated by differences of varying grade. With all this, he has to deal, or thinks he does, with corporations and fishermen, with canoes and steamtugs, with nets and hooks, with cities and forests, with seasons and temperatures and rocks and ice and mud and gravel, with swift current and slack water, with custom and statute, with law and prejudice, with warden and marshal, inspector and policeman, with human tendencies to honesty and fair play, and human tendencies to treachery and deceit. Furthermore, he has, or thinks he has, the temerity, with his British colleague, to reduce all this to order by means of sixty-six regulations or statutes, to be enforced by certain governmental methods, with a reasonable prospect that these statutes may satisfy fishes and fishermen and all else concerned.

The point of all this is that if there were not

real truth involved in these matters, this work could not be done. Not necessarily the whole truth regarding any individual object, but the essential truth in regard to its reciprocal relations and its relations to me. I have to "size up the situation" correctly so far as the process goes, though I may not try to complete the truth as regards a man, a fish, or a nation, a gasoline-launch, or anything in itself. But if, after doing this work, one came no nearer to the thing in itself than the man who never heard of the Great Lakes, and could not tell a net from a sonnet, then we should be forced to admit that psychological realities do not parallel truth nor copy it, nor transcribe it, nor approximate it, nor have anything to do with it. The test in this case is for some one to try it. Similar experiments have been tried millions of times. There is always the one answer. Knowledge is power. Power is the evidence that our belief is knowledge. Efficiency in all things is the resultant of knowledge and training, with the addition of the motive attribute of courage. Knowledge is significant or livable truth. It is in working relations with reality. It has "an effective purchase upon reality," whatever that may be. In proportion as it is effective in endeavor, our impression of anything about us bears a definite relation to the real nature of the thing in itself.

Knowledge in turn is verified by action. Using the Boundary fisheries again as an illustration we

may make this statement. To deny the effective coincidence of my mind-pictures with the facts concerned, would be to assert that as a dream-picture my mind had been able to frame the Great Lakes, the science of ichthyology, the art of fish culture, the idea of law, the geography of Canada and the United States, with the history of both and all other nations. Theodore Roosevelt and Edward VII figure in the accompanying warrants and documents, and if these are not real in this sense, they are equally unreal in any other, for I have only the same type of sense-evidence in either case. Besides, it is a well-attested fact of psychology that dream-pictures or subjective impressions are only memory duplications of past realities. Nothing originates *de novo* in the land of dreams. There is no initiative in subjective imaginations. Such originality as these seem to show, is due to their interconfusion or telescoping. The materials are never new. They are shadows from the past, not beginnings of the future.

Another conceivable point of view would be that instead of having imagined the Great Lakes and the boundary problems from Grand Manan to Tatoosh Light, I had merely imagined that I imagined them. But on this assumption my existence as an Ego and my ability to know, to remember or imagine, would be at the same time impeached. The only tenable theory is to suppose that a reality in the mind matches a reality in the Universe. This reality may match the actuality as a photograph

matches a face, or else as a key matches a lock. The two may be identical, or they may be adjustable the one to the other. Perhaps we do not know which of these two illustrations comes nearest the truth, but some form of workable correspondence is certainly there. In either case, the degree of such matching is measured by livability. By such tests, the methods of science and the conclusions of science carry us progressively nearer to truth. We do not attain, by its tests, to absolute truth, whatever that may be, but the truth involved in clear perception of relations among its constituent elements. Incomplete truth, more or less faulty, is the beginning of new truth, and this again is a starting-point for action.

The final test of error must be found in its effect on human life. Falsehood must kill outright if we trust our life wholly to it. It will thwart and disappoint us in the degree in which we rest upon it our hope or endeavor. When a proposition is found to be "workable," it is not of necessity completely true, but only in so far as we find that it will work. The truth in any doctrine is not the whole of it, nor in general that part which is deemed essential by its upholders. In the methods of science lie our sole means of separating truth from error, and of identifying the relations of cause and effect on which actual livableness must depend.

Ninety-nine per cent. of a doctrine or a dogma may be absolutely false, and yet the whole may be

for a time livable, and therefore to the same extent true. Many a great movement has lived through the single unnoticed germ of truth, enveloped in shining robes of error. In the body of doctrines recently brought together under the name of Christian Science, there is much that is workable, else it would not work; much that is livable, else its followers would not live. Neurotic weakness finds a balm in turning from its own troubles and limitations. In a degree, it is our privilege to heal ourselves by changing our own mental attitude, the cause of our trouble remaining unchanged. But all this, admitting its accuracy, does not render valid the philosophic principle on which these doctrines are alleged to rest, namely, that external things which may cause, or seem to cause, illness, harm, or misery, have no real existence. It does not, for example, tend to prove the claim that "cutting the jugular vein will not cause death, because there is no jugular vein." It does not show that contagious diseases associated with the presence of micro-organisms have no real existence, but are mere phantasms of unwholesome "mortal mind."

The scanty records of the words of Jesus recorded in the four Gospels have furnished the living inspiration of a hundred churches of a thousand creeds. And these have justified themselves by the truth that is in them, not by the forms and ceremonies, the pomp and circumstance, by which this truth has been obscured and confused. When the truth is

grasped and woven into action, the rest is valueless, however imposing in the eyes of the world. In the conduct of life, only truth survives.

An error may be harmless if we do not act upon it. Our everyday judgments of immaterial things are constantly hazy with misconceptions. The real nature of an object concerns us very little if it does not control our action. The things we see may be a squash or a goblin, a granite boulder, or a whiff of vapor; it is all the same to us if we let it alone. The moment we enter into relations with it, its real nature becomes a vital matter. If it be a squash or a boulder in one relation, then boulder or squash it is in all its relations. If we view the squash as something essentially different from what it is, as, for example, the head of a phantom horseman, the error involved may extend to other relations in life. If we do not recognize the truth in things which are nearest, we shall be deceived in remoter things. We shall see portents in comets, and shall overlook the reasons for sanitation. Poisons will seem as foods, and foods as poisons. The whole accuracy and sanity of life becomes impaired. Security of action is always conditioned on the precision with which we size up our relation to external things, and on the correctness with which we reason from the evidence of our senses.

Science is the gathered wisdom of the human race in regard to sense-perceptions. It is collective, not individual. Only a part of it can be grasped by

any one man. The individual can be imbued more or less with its spirit, and can add his own experience to the mass. At the most, this single addition can be but little, and in but few directions. Only a fraction of possible knowledge can come to all men. But the little that an individual man can really know is true as far as it goes. It is as true as the truest thing in the universe. The more this truth enters into the conduct of life, the greater the need for more truth. The same conduct of life demands greater and greater wisdom. Wisdom, as I have elsewhere said, is knowing what one ought to do next. Virtue is doing it. Wisdom and virtue react on each other, and each one creates a greater demand for the other, a greater demand for truth in knowledge and for truth in action.

Religion is fundamentally the warrant for wisdom and for virtue. There must be some reason why the thing to be done next should be attempted rather than something else. Every form of religion the world has known has addressed itself in some fashion to this problem. As those lines of conduct which make for life and strength have in them the elements of survival, so the religions of the world have in the main cast their might on the side of righteousness. This much of truth they have had, that continued leadership implies a degree of wisdom, and wisdom rests on a workable knowledge of realities.

As existence grows more complex, the more in-

sistent is the need of greater precision in our knowledge of ourselves and of the material world in which we move, as well as of invisible forces and tendencies by which the various elements in our universe are related.

The greater our effort, the more insistent become the limiting conditions. One element of power is to know its limitations. The exercise of power demands constantly new accessions of truth as to our environment, and more exact definitions of the truth already partly gained.

"True ideas," William James tells us, "are those that we can assimilate, validate, corroborate, and verify. False ideas are those that we cannot." "Truth lives, in fact, for the most part, on a credit system. Our thoughts and beliefs 'pass' so long as nothing challenges them, just as banknotes pass so long as nobody refuses them. But this all points to direct, face-to-face verifications somewhere, without which the fabric of truth collapses like a financial system with no cash basis whatever. You accept my verification of one thing, I yours of another. We trade on each other's truth. But beliefs, verified concretely by somebody, are the posts of the whole superstructure." Our expression of these laws is, as Professor James observes, not absolutely a transcript of reality, but a convenient summary of old facts which may lead us to new ones. Our theories are "only a man-made language, a conceptual shorthand, as some one calls them, in which we

write our reports of nature, and languages, as is well known, tolerate much choice of expression and many dialects."

Truth gives safety. Whether it gives us rest or comfort or satisfaction depends on other matters. That an idea is agreeable, is no evidence as to its truth. Truth is under no obligation to be palatable.

We may again refer to the claim that the methods of science do not and cannot give us absolute truth. This is, of course, true. Our record of truth is in human experience, and this record is again a response to something real and actual outside ourselves. The record is within us; the impact comes from without. Balfour tells us that the claim that we may "trust in the infallibility of scientific processes has no higher authority than the claim of infallibility made at times by certain religious organizations. As only the senses and the reason can be appealed to in support of the claim of senses and reason, the argument of science is of necessity reasoning in a circle." For these reasons, it is claimed that the conclusions of science should take a subordinate place, as against the absolute truth derived from the innate ideas which rise spontaneously in the human mind.

But we have no certain knowledge of any "innate ideas," which are not themselves derived from any form of human experience. I am sure that I never possessed any. When a religious sentimentalist came to Martin Luther with the claim that he

was guided to the truth by an "Innern Geist" or spirit, Luther replied bluntly, "Ihren Geist haue Ich ueber die Schnautze"—"I slap your spirit on the snout." More politely, perhaps, but quite as firmly, the modern psychologist refuses to consider any purely subjective experience as the source of valid truth.

Innate impulses exist, numerous and complex, but an impulse or tendency to action is not an idea. These are not statements of fact, but formless calls for action. So far as we understand these matters, innate impulses are survivals of primitive tendencies, "inarticulate demands for fact" inherited from generation to generation, because they have proved serviceable as calls to the vital deeds of life. Such impulses spurred our ancestors to necessary acts. Self-defense, hunger, and reproduction, these furnish the source of the primitive motives. Like other forms of instinct, these impulses do not point forward to truth, but backward toward necessity. Their origin is in a past need. Their survival proves their utility.

It is, of course, true that human experience is never actually and purely objective. It is colored by the medium through which it passes. This medium varies with the infinite variety of man. "My mind to me a kingdom is," and whatever enters that kingdom must take its hue from its surroundings.

We may farther acknowledge that each of the senses is subject to illusions of its own, to failure to

represent phases of reality. The sensation must also run the gauntlet of delusion, the failure on the part of the brain or the mind or the consciousness to interpret truthfully what the sense-organs faithfully represent. When we pass beyond the usual range of experience, such failure is the general rule rather than the exception; while inside the range of experience, memory-pictures or traces of past impressions often mingle with present realities to the confusion of subjective truth. Thus, as Balfour observes, life is at best "in a dimly-lighted room." All the objects about us are in some respects quite different from what they seem. Their content as a final whole is unknown, and, perhaps, unknowable. We have no means of recognizing all possible phases of reality. The electric condition of an object may be as real as its color or its temperature, yet none of our senses respond to ordinary variations in electrical conditions. Our eyes give but an octave of the vibrations we call light, and our ears are dull to all but a narrow range in pitch of sound.

But here again, what we have is truth so far as it goes. If in a dimly-lighted room we see a door, we know that it is a door as certainly as if it were illuminated by a calcium light. As Professor Stuart observes, "My ignorance of the electric condition or the radio-active condition of an object beyond the scope of my eyes or the reach of my hands, does not darken the fact that it weighs three pounds or costs five dollars. *It* does not darken anything. *It* may

be itself dark whenever I need to know or wish to know anything about it."

To say that the rose is red to us, is to state the actual and verifiable truth, if by the statement we mean that the rays of light which come to our senses reflected from the rose are those we call red rays. But it may be that in another sense the rose as a thing in itself—"das Ding an sich"—is not red. Perhaps it is really green, for it absorbs the blue and yellow rays of the spectrum, making them its own in an intimate sense. On the same premises, the gold-orange poppy of California may be in its actual nature royal purple, though it is not purple to us. The reflected rays which come from it to us form a chromatic opposite of purple.

We do not, therefore, know the inherent color of any object, if it has any. We only know its color as it appears to us. And this appearance is our truth, not to be darkened or depreciated by our failure to obtain some other kind of truth. The scent which a dog follows is truth, not to be rated of less value because it is wholly inappreciable to human senses, even inconceivable to the human mind, because its nature cannot be expressed in terms of our previous experience.

Just as we may discredit the evidence of the senses, so may we depreciate reason. Reason is our way of disentangling or straightening out our sense-perceptions, and their relations to each other and to ourselves.

In animals "sore bestead by the environment" reason becomes a means of securing safety amid increasing dangers. It is primarily the power to choose among possible reflex responses to external stimulus. From this it rises to the power to trace relations of cause and effect. Complexity of the nervous structure must increase with complexity of environment. The process of adaptation through natural selection develops reason from reflex action. A choice among responses is safer than a single automatic line of action. Those creatures survive whose senses give adequate truth. But natural selection gives no impulse toward complete truth. It provides only ability to secure that truth an animal needs for its own safety, and the safety of its progeny. For animal or man there is no provision for complete knowledge, nor for infallible reasoning. All our knowledge is slightly mitigated ignorance. But to mitigate ignorance is to acquire truth.

But to say that we have no complete knowledge of anything is very different from saying that we know absolutely nothing. That is quite another proposition. To say that, when viewed "in the critical light of philosophy," all our knowledge becomes futile and meaningless, is to talk nonsense in large words. It is urged by Balfour that the simple affirmation, "The sun gives light," loses all its meaning and passes outside the range of possibility, when it is taken out of the category of human experience, and discussed in terms of non-anthropomorphic

philosophy. The sun is simply an unknown mass of matter, if, indeed, it be a mass, and if matter really exists. It can give nothing. It certainly cannot give light, for light is only a mode of motion, a vibration of an unknowable and impossible ether. At the best, we know light only by its apparent, but not its real, effects. But by using words in this way, any fact or happening can be made to appear as unreal as the most fantastic dream. A man may be led to doubt his own existence, and, if so, the existence of any object within his environment. We may take the discussion of "John's John" and "Thomas's John," as given by Dr. Holmes. If John actually exists, is he the real John? Is the John that is, the John as he appears to John himself? Or is the John, as seen by Thomas, the real John? Or is he the composite of the different Johns as seen by Richard and Henry, each one with a varying individuality, and farther and farther away from the John that John thinks that he knows? Is the real John simply the John which constitutes the common element in all this? Or is the real John for the person speaking or thinking, only that John who will "substantiate the predictions made about him in the sense in which they are made"? Have any of these Johns an objective existence to the exclusion of any of the others?

All that we know of the external universe is drawn from impressions made directly on our

nervous system, and from recorded or expressed impressions made on the systems of others. These impressions again have been interpreted in terms of our own experience, and we ourselves are a part of this external universe to be impressed on ourselves. All that we know of ourselves is that which is external to our own consciousness. Thus each unit of human consciousness must form well or ill, broadly or narrowly, a universe of its own. If my mind is my kingdom, this kingdom in all its parts is somewhat different from any other mental universe. It is, moreover, constantly changing. It was made but once, and it will never be duplicated. When my vital processes cease, this kingdom will dissolve "like the baseless fabric of a dream, leaving not a wrack behind." Our minds are of "the stuff that dreams are made of," and our bodies are not more real—if, indeed, even for purposes of philosophy, we may separate mind from body.

Physically each man is an alliance of zooids, of energides, of centers of protoplasmic action; each so-called cell, or energide, a sort of quasi-individual organism; each member of this alliance having its own processes of life, growth, death, and reproduction; each one with its own cell-soul, which in some unknown fashion presides over all these processes. In the alliance of these cells forming tissues and organs, we have the phenomena of mutual help and mutual dependence. We have these also in the phenomena of

human society. In man these features of organic life are seen on a larger and more complex scale than in the lower forms, but an analysis of these phenomena in either case leaves little meaning to the word "self." "I think, therefore I am" gives place to "we think, therefore we are." But that again is not true; for we think only as co-operating groups of centers of energy, not as individual units of life. The self or ego is an attribute of one changing alliance as set off against another. What is the vital force which holds this alliance together? What is vitalism as distinct from mechanism? Is either anything more than a name for the chemical attributes of complex changing organic molecules? Of what are these cells composed? Carbon, oxygen, hydrogen, nitrogen, mineral salt. We know these by name. We can isolate them and test their properties. But how do they differ one from another? Are their differences real and permanent? They are forms of matter, and they are subject to modes of motion. But does matter really exist? Some mathematicians claim that all relations of ponderable matter and force might hold if the atoms of matter, or the ions which compose them, were not realities at all, but merely relations of part to part in a universal ether. Each of these units possessed of attraction or weight may be a vortex ring or eddy in the ether, of which the ultimate atoms have vibration, but not attraction. If, therefore, the body of man be an alliance of millions on millions of animal

zooids, each cell being composed of millions on millions of eddies in an inconceivable and impossible ether, if the nature and existence of all things around us be the same, and if, in detail, it be recognizable only by its effect on the most unstable part of this unstable structure, we stand appalled at the unreality of the whole thing; we must fall back again on the realities of common sense, from which we find another starting-point. Once more things become real and tangible. From speculations as to the nature of matter we turn with relief to this sentence of Professor William S. Franklin,* as quoted by Dr. James:

"I think that the sickliest notion of physics, even if a student gets it, is that it is the science of masses, molecules, and the ether. And I think that the healthiest notion, even if a student does not wholly get it, is that physics is the science of the ways of taking hold of bodies and pushing them. These concepts of mass and molecule and ether are validated, if at all, and so far as they are at all, by the contribution they make to the effective taking hold of bodies and pushing them."

In the process of taking hold of things and pushing them, we have found some guides in the conduct of life. We know that we have developed some propositions workable and livable. We have gained some truth which stands our severest tests. This truth holds its own, from whatever side we

* *Science*, January 2, 1903.

may assault it. We can trust our lives to it, and to the methods by which we have worked it out. Every day, perhaps, as already indicated, we trust our lives to the methods of the chemist, and to those of the electrician. Each conclusion of science represents a continuous testimony of human experience. Observation and experiment form the basis of science. The two are one in essence. An observation is our record of an experiment which has gone on for ages, and in which the setting is beyond our powers. In an experiment, we arrange the minor details of the setting to fit our own limitations. The breaks in the testimony of experience but add to it strength, for each apparent break is but the appearance of a new principle, a new relation of truth.

The "philosophic doubt" of the reality of external things is often simply the rhetorical trick of describing the known in terms of the unknown. Philosophic doubt, as set forth by Mr. Balfour, seems to be a process by which men question the only things they know to be true, in order to prove the reality of things they know are not true. To show that truth and falsehood are indistinguishable in the one case, is used as an argument to prove that falsehood is truth in another case, and that truth and falsehood are alike as a general thing. That subjective sensations often force their way among objective realities, is no evidence that the universe about us is, after all, subjective.

We may use the same philosophic process, in describing to the child the sound of a bell in terms of nerve-fiber irritations in the auditory capsules, due to the tintinnabulations of the tympanic drum, in response to the impact of atmospheric molecules set in motion by remote vibrations of a large metallic body. And the child's answer, "it is just a bell," is essentially scientific. For the child, this describes the sensation in terms of previous experience. Constructively, by the process of doubting the real to prove 'ne unreal, we may build up out of the commonest material—the dregs of teacups, or the waves of clouds, or the entrails of animals, an "occult science" or a new sciosophy. It is possible to speak of the unknown in terms of the known, of the infinite in terms of human experience. In this fashion, men have talked with God, and reported their conversations in diverse languages. In this fashion, Balfour gives to his positive foundations of belief an apparent reality as fallacious as the unreality he assigns to the foundations of science. To speak of the unknown in terms of the known, is the basis of the conception of the anthropomorphism of God. This fallacy gives point to Haeckel's sneer at the current conception of Deity as that of a "gaseous vertebrate." "The measure of a man" is the basis of human knowledge, and only that which can be brought to the measure is part of man's knowledge.

But, however unattainable the conception of com-

plete and final truth, partial and workable truth surrounds us everywhere, and through this truth every man and every animal has its hold on existence. In this hold on existence Science has her origin. It is the business of science to discriminate between realities and illusions, between objective and subjective nerve conditions, between rationality and delusion. A reality is an impression made by a contemporaneous event. An illusion is an impression made by a past event, or by a derangement in the structure, or operation of the nerve structures themselves. It is easy for common sense to tell a reality from an illusion. To be able to do this, is the essence of sanity. Science is sanity. Sanity is livable. Insanity is not.

Delusion and illusion are alike destructive in the conduct of life. The "borderland of spirit," of which we hear much of late—the debatable territory where subjective creations and objective facts jostle each other at will—is a dangerous region for the living man to traverse. In so far as one is leading a passive life, not concerned with earning his bread or with controlling the affairs of others, these dangers may seem of little importance, because they are never brought to the test of actuality. But the man who does things, must know exactly what he is doing. He cannot afford to confuse subjective and objective conditions. He cannot confuse his realities with the creations of dreams or of drugs.

Among men in a general way, "hearts insurgent," impulses uncontrolled, recklessness as to the results of conduct and to the teachings of human experience, mean short shrift in the world of actualities.

It is true, as I have said, that every "reality" has a large subjective element. The impression made by an external object is modified by the nature of the object on which it is impressed, and by the number and character of previous records on which it is, as it were, superimposed. It is not the external fact, but our record of it, with which we must deal. The impression made by the shot of a gun becomes a reality when the pressure of the air-waves reaches our nerve centers, though the explosion may have preceded the "reality" by several seconds. Whatever else it may be, this explosion is not a noise as we hear noise. But the noise bears a definite relation to the explosion which is its source. It has a known and tested relation to powder and shot, and the pull on the trigger. It must give to the mind information by which the actual occurrence may be correctly interpreted, although in terms of previous occurrences. On the accuracy of this interpretation the fitness of our response through nerve control of the muscles must be conditioned. In every-day matters, as those relating to the squash in the garden, the dictates of common sense are obvious enough. The impression and response are alike simple. Our emotions are not moved by the squash,

nor is our recognition of its nature vitiated by an illusion. No delusion results from any defects in our reasoning in regard to it. But in very many relations of life, the truth is involved in difficult conditions and the problem of common sense is rendered most complex. To discriminate in a complex and bewildering environment, is the task of the higher common sense, which we call science. The degree of coincidence of our subjective impressions with objective truth, is graded by its livability, by its veracity in terms of life. Actuality and reality, object and impression, are not the same—any more than the shadow is identical with the substance, but the shadow follows the substance with never an innovation on its own account. For a man to deceive himself in any large degree, to make of this world a fools' paradise or a fools' hell, which is another name for the same thing, is commonly to find a short way out of it. This fact in all its bearings is our final proof that man deals with a world outside of himself, not with one merely imagined by him. Wisdom is our knowledge of this outside world. Long life and large influence are derived from wisdom. Virtue is the working arm of wisdom, and wisdom and virtue, according to the testimony of all the ages, unite to make life effective. Folly and vice soon destroy our freedom, and hand us over to the crushing grasp of the giants. We lie prone "at the feet of the strong god Circumstance," unless we can find out for our-

selves the method by which this strong god may be made to work in our behalf. In our knowledge of ourselves and of our limiting relations, we find the truth that makes us free.

Our experience with the objective universe and its effects on our subjective consciousness, seems to imply the existence of a still larger consciousness, in which objective and subjective should be united. The objective universe should be within the grasp of some intelligence. The final answer to the world problem cannot be disconnected, disjointed matter and force in unrelated fragments. The universe is too gigantic, too complex, too exact in its relation of cause and effect, too conscientious in its rewards and punishment, to exist in our consciousness alone. There seems to be outside ourselves, as well as within, a compelling "force that makes for righteousness." Outside ourselves is "the ceaseless flow of energy and the rational intelligence that pervades it." No part of this flow of force can we fully comprehend, but we can realize its persistence and the consistency of its methods. We find no chance movement in the universe, "no variableness, no shadow of turning." That there should exist a "law of Heaven and Earth whose way is solid, substantial, vast, and unchanging," seems to imply an intelligence adequate to have made it so, and to comprehend it as a whole, not merely as shown in casual and inexorable fragments. This intelligence should deal with terms of

absolute truth, freed from all figures of speech drawn from human experience, and of all anthropomorphism imposed by the limitations of human action. Only a "God of the things as they are" can "know things as they really are," and in our relations to these things, we become conscious of the condition of being, gracious and inexorable, the "Goodness and Severity of God."

It is said that if any geologist were to make a cross-section of the Andes or the Sierra Nevada anywhere, he would in this section have a clue to the whole formation of the Cordilleras, the greatest mountain system on the globe. In like fashion, if any man of science or any philosopher could form a complete picture of any object or of any act whatever, he would hold the key to the Universe. To strive to gain this key has been the perennial ideal of philosophy. To attain such knowledge of the relations of things as to safeguard the conduct of life, is an ideal of science. From materials science has tested may be built up a philosophy. If we were to know anything, "all in all," "a flower in a crannied wall," or a bit of the wall itself, we should have the clue to everything, "we should know what God is and man is."

In the various forms of applied science, or knowledge in action, the anthropomorphic element is everywhere evident. If man is to use his knowledge, it must be workable by him. Its truth must in some degree be brought to the measure of a

man. This man-adapted quality has been called the "dramatic tone" in science. "Activity is imputed to phenomena for the purpose of organizing them into a dramatically consistent system."

On the basis of human relations, philosophy tries to look at the universe in some degree as through the eyes of God. This purpose is most exalted. Its efforts are justified by their effects on the conduct of life. The subject-matter of philosophy ranges from the puerile to the incomprehensible and only science—that is, organized "common sense"—can distinguish the two. Good and bad, not embodied in concrete cases, are alike abstractions. Human knowledge and human action have human limitations. One of these is that whatever cannot be stated in terms of human experience, cannot be comprehended by man. Whatever cannot be thought, cannot be lived. Whatever cannot be lived, is not yet true.

To the category of philosophy belongs what we commonly call belief. Belief is a general faith in the final result of the varied elements which enter into the experience of life. From time to time one or another phase of belief has crystallized into a creed. A creed (*credo*) is my statement of what I think is true. It is my interpretation of my own grouping of my own realities. A creed is alive when it is livable, when it looks backward to human experience, forward to the conduct of life.

"The essence of belief," says Dr. Charles San-

ders Peirce, "is the establishment of a habit, and different beliefs are distinguished by the different modes of action to which they give rise. If beliefs do not differ in this respect, if they appease the same doubt by producing the same rule of action, then no mere differences in the manner of consciousness of them can make them different beliefs, any more than playing a tune in different keys is playing different tunes. Imaginary distinctions are often drawn between beliefs which differ only in their mode of expression; the wrangling which ensues is real enough, however."

In clever paradox, Chesterton says: "Some people call a creed a dead thing. The truth is, a creed is not only a living thing, but it is the only thing that can live. It was exactly because revolutionists like Swinburne would not have a perpetual creed, that they did not have a perpetual revolution. It was because Swinburne would not fix his faith that he fell away afterwards into accidental and vulgar jingoism, and, indeed, narrowly escaped being made poet-laureate."

Of course, not even so audacious an essayist as Chesterton would claim permanence for any actual creed in the actual world. The creeds of Christendom change with the changing years. It is not the formulation which endures, but the spirit which has led men to believe that there was indeed something to formulate.

The creeds which express a veering philosophy,

the subtleties of theological dogma, have no permanence in human history.

But the verities of human life, the common experience of love, sorrow, hope, faith, action, religion, these do not change. Like the truths of external nature, all these are forever renewed and verified by renewed human experience. Love makes for life. Action is life. To give life more abundantly, is the essence of religion. We can trust life, that life is worth living. We can trust action; for action is the primal purpose of feeling and thinking. We can trust love, for it has its justification in happy and wholesome life. These intangible forces, on which rests the development of religion, have been pre-eminently safe in the history of mankind. A certain dignity attaches itself to a creed, however crude or even absurd in the logic of its statement, because it is in some degree associated with religion, and then it deals in some degree with the noblest springs of human conduct. We can therefore believe, "believe and venture," even though some part of our belief is not at once reducible to terms of human experience.

In his "*L'Évolution Créatrice*," Henri Bergson* thus expresses the function of the intellect in the face of realities:

"The human intellect is not at all such a thing as Plato represents in the allegory of the cave. It is as little its function to gaze idly upon shadows

* Translation of Professor Arthur O. Lovejoy.

as they pass, as it is, turning backward, to lose itself in the contemplation of the celestial splendor. It has other work to do. Yoked like oxen to a heavy task, we feel the play of our muscles, the weight of the plow, the resistance of the soil. To act, and to know that we act, to enter into contact with reality, indeed, to live reality . . . such is the function of man's intellect. Philosophy can be but an effort to immerse ourselves afresh in the universal life."

II

REALITY AND THE CONDUCT OF LIFE

"The animal supports itself upon the plant; man goes astride the animal, and all humanity, scattered through space and time, is one immense army, galloping beside and behind and before us, drawing each of us on in a sweeping charge that can beat down every resistance."—HENRI BERGSON.

EVOLUTION is orderly change. Organic evolution is the orderly change in the succession of living organisms. In the main it is a process of adaptation, by which the needs of the organism are brought into closer and closer correspondence with the demands of the environment. Every step in advance is a concession to the environment, and each concession demands still others in the direction of more perfect adaptation. The movement towards adaptation is conditioned on the destruction of the non-adapted and the non-adaptable. This process is known as Natural Selection. It is the only known cause of the forward movement in the process of evolution. Other factors, internal and external, enter into the processes of orderly change, but the survival of the fittest in the struggle for existence is apparently

the sole reason for the ultimate presence and persistence of fitness or adaptation of all sorts and kinds.

The trend of organic evolution is, therefore, toward safer relation of activity to environment. In its higher phases it is demand for wisdom in action. Human development finds its culmination in the rational conduct of life. The most highly organized structures are those of the brain and nervous system. The finest material known to chemistry goes to form the human brain. The brain and its associated structures form what we may term a device for making action safe. The safety of action is the animal's test of realities. Conduct of life in the large sense means the rational choice among all possible responses to environmental stimulus. Intelligence in the higher animals and man involves the choice of responses as distinguished from the "tropism" or mechanical responses of the lower animals and plants, and as distinguished from the instincts or automatic complex responses shown by all the higher animals and by men.

All sensation is correlated with the power of action. If an organism is not to act it does not feel. The mind is at bottom and primarily the director of motion and of locomotion. With the increasing complexity of the functions of action, the nervous system and its functions become more complex. Wherever motion exists in organic nature, there is

some corresponding irritability or sensitiveness to external conditions. This irritability is of the nature of mind. In a complex organism, the structure and position of the sensorium or mind center depends on the work it has to do, or, rather, through heredity, it repeats the duties the organ has had to perform in the life of the creature's ancestors.

A typical plant may be regarded as a sessile animal, an organism which does not move. It is a colony of organic cells with the power of motion within its parts, but without the power of moving as a whole. It draws its nourishment for the most part from inorganic nature, from air and water. Its life is not conditioned on a search for food, nor on the movement of the body as a whole. This search is conducted by means of the feeding parts alone. These feeding parts turn toward or from the sun, upward or downward under the impulse of gravitation, outward toward water or other food. Darwin has shown the circumnutation or spiral squirming of all the growing parts of a living plant. That the plant has no nerve centers is due to the fact that, being sessile, it cannot make use of such centers. Its mind, if we may use the expression, is diffused through the region of its growth. But when cells are co-ordinated to form an animal, or moving and feeding organism, some sort of central control becomes a necessity, to be developed in proportion to the demands laid upon it. Such control

in its degree is the conduct of life. The successful conduct of life is the verification of the "realities," impressed by the environment on the animal's nervous system.

We may perhaps not improperly turn from the rudimentary and unilluminated conduct of life possible to the lower animal, to consider the same matter in a much higher phase. The conduct of life is the noblest art possible to man. The essential function of religion is found in the control of the conduct of life in its loftiest aspects. The spread of any form of religion indicates that it rests on a degree of truth. This is proved by its workableness, though the fact that it meets conditions in human life does not tend to verify other assumptions which may be connected with it. That the Mormon religion may tend to make men sober and industrious, or that it gives consolation on the death-bed, speaks for its truth or at least for its utility, but it does not in any degree argue for polygamy, nor does it verify the visions of Joseph Smith. These must be judged by other and very different tests.

The vitality of the religion of Jesus rests on its fitness to the needs of civilizing and civilized men. The founder of this religion was not interested in mysteries and superstitions, in creeds and arguments, in pomp and circumstance, in imperialism or ecclesiasticism. No ceremony was sacred to him, no emotion praiseworthy, unless it led to doing. Its test he found in its fruits. Let it "feed my

lambs." Life is justified by service, not by domination nor by happiness alone.

To believe that life is worth living, to trust to the reality of external things as reproduced in the realities of the human mind, to have red blood in one's arteries, to throw oneself with courage and enthusiasm into the affairs of the day, to be satisfied with the universe as it is, and to be happy, to play a man's part in it, all this is justified by the tests of science. All this makes for the abundance of life. It is a sufficient answer to the philosophy of despair, that pessimism is not livable. A philosophy which impedes or confuses our conduct of life cannot be sound doctrine. Happiness in this world is the accompaniment of normal life, in normal action, in normal relationship to external things. It can be secured on no other terms. Happiness makes room for more happiness, while imaginary pleasures, the illusions of nervous disorder, hysteria, and drunkenness destroy the nervous system itself, and render rational enjoyment impossible. Doing, struggling, helping, loving, always something positive, something moving, is the condition of happiness.

Each living being is a link in a continuous chain of life, going back in the past to the unknown beginnings of life. Into this chain of life, so far as we know, death has never entered, because only in life has the ancestor the power of producing and casting off the germ cells by which life is continued.

Each individual is in a sense the guardian of the life chain in which it forms a link. Each link is tested as to its fitness, by the conditions external to itself in which it carries on its functions. Those creatures unadapted to the environment, whatever it may be, are destroyed, as well as those not adaptable. And this environment by which each is tested is the objective universe. It is not the world as man knows it. It is the world as it is. Nature has no pardon for ignorance or illusions. She is no respecter of persons. Her laws and her penalties consider only what is, and have no dealings with semblances. By this experience we come to know that reality exists, that there is an external world to the demands of which our senses, our reason, our powers of action are all concessions. The safety of each chain of life is proportioned to the adaptation of its links to these conditions. This adaptation is, in its essence, obedience. The obedience of any creature is conditioned on its response in action to sensation or knowledge. Sense perception and intellect alike stand as advisers to its power of choice. The power of choice involves the need to choose right; for wrong choice leads to death. Death ends the chain of which the creature is a link, and the life of the world is continued by those whose line of choice has been safe. Death is not the punishment for folly, but it is folly's inevitable result, given time enough. Severity of condition and stress of competition are met in life by

the survival of those adequate to meet these conditions. Thus, in the struggle for existence in organic life, when instinct and impulse fail, reason rises to insure safety. At last with civilized man reason comes to be a chief element in the guidance of life. With greater power to know, and hence to choose safely, greater complexity of conditions becomes possible, and the multifarious demands of modern civilization find some at least who can meet them fairly well. To such the stores of human wisdom must be open. To others, safety in new conditions lies only in imitation. The multitudes of civilized men, like the multitudes of animals, are kept alive by the instinct of conventionality. The instinct to follow those who have passed over safely is one of the most useful of all impulses to action. In the same connection we must recognize authority as a most important source of knowledge to the individual; but its value is proportioned to the ability of the individual to use the tests wisdom must apply to the credentials of authority.

But instinct, appetite, impulse, conventionality, and respect for authority all point backward. They are the outcome of past conditions. "New occasions bring new duties," and new facts and laws must be learned if men prove adequate to the life their own institutions and their own development have brought upon them. To the wise and obedient the most complex life brings no special strain or discomfort. It is as easy to do great things as

small, if one only knows how. But to the ignorant, weak, and perverse, the extension of civilization becomes an engine of destruction. The freedom of self-realization involves the freedom of self-perdition. Hence appears the often-discussed relation of "progress and poverty" in social development. Hence it comes that civilization, of which the essence is mutual help or altruism, seems to become one vast instrument for the killing of fools.

In the specialization of life, conditions are constantly changing. Every age is an age of transition, and transition brings unrest because it impairs the value of conventionality. With the lowest forms of life there is no safety save in absolute obedience to the laws of the world around them. This obedience becomes automatic and hereditary, because the disobedient leave no chain of descent. All instincts, appetites, impulses to action, even certain forms of illusions, point toward such obedience. Whether we regard these phenomena as variations selected because useful, or as inherited habits, their relation is the same. They survive as guarantees of future obedience because they have enforced obedience in the past. With the most enlightened man, the same necessity for obedience exists. The instincts, appetites, and impulses of the lower animals remain in him, or disappear only as reason is adequate to take their place. And, in any case, there is no alleviation for the woes of

life "save the absolute veracity of action, the resolute facing of the world as it is."

The intense practicality of all this must be recognized. The truths of science are approximate, not absolute. They must be stated in terms of human consciousness. They look forward to possible human action. Knowledge which can only accumulate, without being woven into conduct, has been ever "a weariness to the flesh." As food must be formed into tissues, so must knowledge pass over into action. In the lower animals, sensation, automatically, in large part, passes over into motion. In like manner, in man sensation and thought find their natural result in action. In like fashion, science leads to art, knowledge to power. Power and effectiveness are conditioned on accuracy. Every failure in the sense-organs, every form of deterioration of the nerves, shows itself in reduction of effectiveness. Reduced effectiveness manifests itself through the processes of natural selection as lessened safety of life. Thus the degeneration of the nervous system through excesses, through precocious activity, or through the effect of drugs, shows itself in untrustworthy perceptions, in uncontrolled muscles, and in general insecurity. Incidentally, all these are recorded by fall in social standing. The sober mind is necessary to the security of life.

In general all civilized men are well born. They come of good stock. For the lineage of perversity,

insanity, and even stupidity, is never a long one. The perverse, insane, and stupid survive through the tolerance of others. They cannot maintain themselves, and, in spite of charity and the sense of conventionality, the mortality caused by the "fool-killer" is something enormous. It is an essential element in race progress. It increases with the advance of civilization, because of increasing complexity of conditions. It is an offset for the systematic life-saving which science makes possible, and which virtue makes necessary. Men fail in life through lack of whole-hearted interest in the things around them which might be at their service, and in their "shuffling attitude" in the face of observed or observable cause and effect.

The recent "recrudescence of superstition," a striking accompaniment of an age of science, is in a sense dependent on science. Science has made it possible. The traditions of science are so diffused in the community at large that fools find it safe to defy them. Those who take hallucinations for realities; those whose memory impressions and motor dreams a defective will fails to control; those who mistake subjective sensations produced by disease or disorder for objective conditions—all these sooner or later lose their place in the line. In falling out, they take with them the whole line of their possible descendants. The condition of mind which is favorable to mysticism, superstition, and revery, is unfavorable to life, and the continuance

of such condition leads to misery. On the billboard across the street, as I write, I see the advertisement of a lecture on "The Ethical Value of Living in Two Worlds at Once." Whoever thus lives in two worlds is certain soon to prove inadequate for one of them, and this will be the one most charged with realities.

If all men sought healing from the blessed handkerchief of the lunatic, or from contact with old bones or old clothes; if all physicians used "revealed remedies," or the remedies "Nature finds" for each disease; if all business were conducted by faith; if all supposed "natural rights" of man were recognized in legislation, the insecurity of these beliefs would speedily appear. Not only civilization, but civilized man himself, would vanish from the earth. The long and dreary road of progress through fool-killing would for centuries be traversed again. That is strong which endures. Might does not make right, but that which is right will justify itself as the basis of race stability.

So closely is knowledge linked to action, that in general among animals and men sensation is absent or not trustworthy when it cannot result in action. Objects beyond our reach, as the stars or the clouds, are not truthfully pictured. Accuracy of perception grows less as the square of the distance increases. It is a recognized law of psychology that only medium variations and differences are correctly estimated. The senses deal correctly only

with the near, the mind only with the common. The unfamiliar lends itself readily to illusions. The familiar is recognized chiefly by breaks in continuity. The real forces of nature are hidden by their grandeur, by their duration. Men see the waves on the surface of the sea, but not the mighty tides beneath it. Again, the senses are less acute than the mechanism of sense organs would make possible. This is shown through occasional cases of hyperæsthesia or ultra-sensitiveness. This occurs in abnormal individuals, or in diseased conditions. It occurs normally in creatures whose lives in some sense depend on it. Thus some of the most remarkable exhibitions of "mind reading" may be paralleled by retriever dogs, who have been purposely bred to sustain the hyperæsthesia of the sense of smell. Hyperæsthesia of more than one of the senses would be to most animals a source of confusion and danger rather than of safety. The high development of the brain in man in large degree takes the place of acuteness of special senses. It is part of the function of the will to regulate the senses and to suppress those impressions which should not lead to action.

In his perception of external relations man is aided by the devices of science, which may be taken up or laid down at will. By means of instruments of precision any of the senses may be extended to an enormous degree, and at the same time the personal equation or individual source of error is

largely eliminated, or, rather, standardized and methodized. The camera may be focused to any desired degree of clearness of image. Once adjusted the instrument tells its story. There is no evading its report. The use of instruments of precision is the special characteristic of the advance of science. No instrument of precision can give us the ultimate essence of any part of the universe. No scientific experiment can do away with the measure of human experience as the basis of intelligibility. At the same time we can throw large illuminations into the "dimly lighted room" in which the phenomena of consciousness take place. By the simple process of photography, for example, we may reproduce the objects of environment. That such pictures do express phases of reality admits of no doubt; for in the photographic camera all personal equation is eliminated. As to form of outline and reflection of light, "the sun paints true" under our direction as to method, and the paintings thus made by means of the action of non-living matter produce on our senses impressions coinciding with those of the outside world itself.

How do we know that this is truth? Because confidence in it adds to the safety of life. We can trust our lives to it. If it were an illusion it would kill, because action based on illusion leads, in the long run, to destruction, though it may take more than the single generation to demonstrate this fact.

One can trust his life, as elsewhere stated, to the

message sent on a telegraph wire. All who travel by rail do this daily. One can trust his life to the reading of a thermometer. The chemist's tests will select for us foods among poisons. We may trust these tests absolutely. We may safely and sometimes wisely take poisons into our bodies if we know what we are doing. By the advice of a physician, trusting in the weigher's instruments of precision, poisons may do no harm. One mite of strychnine may be an aid to vital processes; a dozen may mean instant cessation of these processes by the unmeasured intensity of their action. The chemist's balance advises us as to all this. All these instruments of precision belong to science. They are examples taken from thousands of the methods of "organized common sense."

By means of common sense, organized and unorganized, all creatures that can move are enabled to move safely. The security of human life in its relations to environment is a sufficient answer to the "philosophic doubt" as to the existence of or possibility of authentic knowledge of external nature; for if all phenomena were within the mind, no one of them could be more dangerous than another. A dream of murder is no more dangerous than a dream of a "pink tea," so long as its action is confined to the limits of the dream. But the relation of life to environment is inseparable and inexorable. Cause and effect are perfectly linked. This is a world of absolute verity, and its demand is abso-

lute obedience. Life without concessions or conditions is the philosopher's dream. By constant concession we control our environment, raising the human will to the rank of a cosmic force.

What we know as pain is the necessary signal of physiological danger. Without pain, life, conditioned by the environment, would be impossible. Organic beings need such a stimulus to veracity. Those dangers which are painless are the hardest to avoid; the diseases which are painless are the most difficult to cure, because the patient has no faith in their existence.

The ideal in the mind tends always to go over into action. The noble ideal discloses itself in a noble life. It is part of the wisdom of each generation, its science as well as its religion, to form the ideals of the next. History is foreshadowed in these ideals before it is enacted on the stage of life.

If the strong man is to rise above conventionality, suggestion, and authority as guides to conduct, so must he rise above the domination of hereditary impulses. Conventionality and authority hold in check the bodily impulses, once necessities under wild and rude conditions. To escape from human control to be ruled by the animal passions is not liberty. No man becomes a genuine "superman" except through self-control, superior to that of other men.

An old parable of the conduct of life shows man

in a light skiff in a tortuous channel beset with rocks, borne by a falling current to an unknown sea. He is kept alert by the dangers of his situation. As his boat bumps against the rocks he must bestir himself. If this contact were not painful he would not heed it; if it were not destructive he would not need to heed it. Had he no power to act, he could not heed it if he would. But with sensation, will, freedom to act, narrow though the limits of freedom be, his safety rests in some degree in his own hands. That he has thus far steered his course fairly well is shown by the fact that he is still above-board. He may choose his course for himself—not an easy thing to do, unless he scan most carefully the nature of rocks and waves, and weigh carefully his control of the boat itself. He may follow the course of others with some degree of the safety they have attained. He may follow his own impulses, in man's case inherited from those who found them safe guides to action. But in new conditions neither conventionality nor impulse nor desire will suffice. He must know what is about him in order that he may know what he is doing. He must know what he is doing in order to do anything effectively. Ignorant action is more dangerous than no action at all. Man must realize the aim of his effort. He must know what he is striving to do in order so to question reality as to secure answers that shall further and shall refine his activity. The "sealed orders" which control the lower ani-

mals and our "brother organisms, the plants," are not adequate for the conduct of human life. With the power of movement and the "knowledge of good and evil," man has no choice but to accept the conditions. And thus it comes again that there is "no alleviation for the sufferings of man except through absolute veracity of thought and action, and the resolute facing of the world as it is."

And for the same reason also it is well for man not to "pretend to know or to believe what he really does not know or believe." The appetites, impulses, passions, illusions, delusions even, which have proved safe in the past development of life, science would not destroy. But these must be subordinate to the will and the intellect. And this subordination of the lower to the higher motives in life is the certain trend of human evolution, as it has been the ideal of those who, in the name of religion, have striven worthily for man's spiritual advancement.

III

REALITY AND MONISM

"The analysis which is necessary to let us master the phenomena of life furnishes us with a surer base than that which leads directly to explain such phenomena."—ALFRED GIARD.

ONE of the conspicuous features of modern philosophical discussion is a revival in the name of science of the doctrine of Monism. A phase of this doctrine is that of "a completely unified knowledge in which physical and mental world meet on equal terms." This, according to James, was "the original Greek ideal to which men must surely return."

The doctrine of monism, in whatever form, proclaims the essential unity of things which, in their various contacts with human experience, appear to us different. The primal conception of monism is that there is one spirit or one essence in all that exists, whether ponderable or imponderable, whether visible or invisible, tangible or impalpable; that the whole cognizable world is constituted and has been developed in accordance with one common fundamental law. This one is defined as "the concrete

unified whole of all that is." In this view we are to conceive that all categories at bottom are one, matter and force, sense and spirit, object and subject, Nature and God. This fundamental conception of monism has never been made really intelligible, because it can be stated in no terms of human experience. There is no way known to us by which we can expose it to scientific tests. Whether it be the noblest generalization of philosophy or a mere play on words, no one can say, for no one knows. No one yet knows how to find out.

According to Professor Stuart, "There are two ways in which it may be sought to establish a monistic hypothesis: (1) We may try to synthesize all descriptive science to the end of showing how all phases of reality are expressions of a common principle. This is what Spencer, for one, attempted. (2) It may be argued from the fact that science and mathematics exist that knower and known must be of kindred nature. From the fact that we see no limit to the possibilities of scientific research we may infer that all reality is knowable, though not known. The first of these principles is Kantianism, although Kant was not a monist, by profession at least. Those who came after him, Hegel and other idealists, thought that they saw a way of establishing monism by combining these two general premises. This is, in a sense, an empirical proof of monism, though we may regard the logic as insecure."

Man is able in a certain way to make his way in

the world. Obviously, then, he is not an alien utterly. He is thus far in unity with the rest of the universe. So much of monism we may all accept. The amount and nature of this "unity" we cannot define. Whether we can accept such unity of nature once for all and wholesale, in face of the visible lack of unity about us, becomes a test of our faith in monism.

The doctrine of monism can be brought to a final verdict of science, if its logical necessities come within the domain of action. To all the tests we can give, of course, force is not identical with matter, though the two have never been separated. To all the tests we can give, there are many different kinds of matter, and many different ways in which energy may show itself. At the most, those who hold to the unity of matter in its chemical forms may maintain that units of matter are subject to breaking up, to evolution, or to processes of recombination. Thus far our chemists have not found it so.

"Rational unity of all things," as Professor James admits, "is an inspiring conception," but it seems to involve a condition of the universe in which "reality is ready-made and complete from all eternity," while, in apparent fact, reality "is still in the making, and awaits part of its completion from the future. On the one hand, the universe is absolutely secure, on the other it is still pursuing its adventures."

On the one side, according to James, "we have only one edition of the universe, unfinished, growing in all sorts of places, especially in the places where thinking beings are at work. On the rationalist side, we have a universe in many editions, one real one, the infinite folio, or edition de luxe, eternally complete, and here the various finite editions, full of false readings, distorted and mutilated each in its own way." "It is impossible not to see a temperamental difference at work in the choice of sides. The rationalist mind, radically taken, is of a doctrinaire and authoritative complexion. The phrase, 'must be,' is ever on his lips. The belly-band of its universe must be tight. A radical pragmatist, on the other hand, is a happy-go-lucky, anarchistic sort of creature. If he had to live in a tub like Diogenes, he wouldn't mind at all, if the hoops were loose and the staves let in the sun."

"Whoever claims absolute theological unity," I quote again from Professor James, "saying that there is one purpose that every detail of the universe observes, dogmatizes at his own risk. Theologians who dogmatize thus find it more and more impossible, as our acquaintance with the warring interests of the world's parts grows more concrete, to imagine what the one climacteric purpose may possibly be like. We see, indeed, that certain evils minister to ulterior goods, that the bitter makes the cocktail better, and that a bit of danger or hardship puts us to our trumps. We can vaguely

generalize this into the doctrine that all the evil in the universe is but instrumental to its greater perfection. But the scale of evil actually in sight defies all human tolerance and transcendental idealism in the pages of a Bradley or a Royce brings us no farther than the book of Job did. God's ways are not as our ways, so let us put our hands upon our mouth. A god who can relish such superfluities of horror is no God for human beings to appeal to. His animal spirits are too high. In other words, the Absolute with His one purpose is not the man-like God of Common People."

We may balance against this striking and half-humorous statement these words of Charles Ferguson:

"The beginning of Science is in Congeniality with God. The larger word for science is conscience, and the final test of the authenticity and permanence of a physical fact is its moral reasonableness—its congruity with right. Do you protest sometimes with vehemence that God is cruel and unjust? Justice must then be rooted very deep in the heart of things since it dares to confront omnipotence with a fist so feeble to back its claim! But you may well! You must not submit to be bullied by earthquakes and tornadoes, or by the sun, moon, and stars. If royalties and usuries and monopolies are unjust, they must not be tolerated. And if gravitation and cohesion are unjust, they must be put down. Unless you believe in the reasonableness of the world it is idle to think about it

at all. . . . There is no use having brains without faith and courage."

Still more impressive is the following passage, quoted by Professor James from Benjamin Paul Blood:

"The highest thought is not a milk and water equation of so much reason and so much result, no school sum to be cast up. We have recognized the highest divine thought of itself, and there is in it as much of wonder as of certainty; inevitable and solitary and safe in one sense, but queer and cactus-like in another. It appeals unutterably to experience alone. There are sadness and disenchantment for the novice in these inferences as if the keynote of the universe were low. Certainty is the root of despair. The inevitable stales while doubt and hope are sisters. Not unfortunately, the universe is wild, game-flavored as a hawk's wing. Nature is miracle all. She knows no laws. The same returns not, but to bring the different. The slow round of the engraver's lathe gains but the breadth of a hair, but the difference is distributed back over the whole curve, never an instance true—*ever not quite!*"

The universe is most certainly "a going concern," to use William Allen White's description of American democracy. No man, no day, no incident has ever been here before, almost, always, but never quite the same. Wherever we are, and in whatever environment, we are the first of our dynasty, "We are the first that ever burst into this

silent sea!" exclaims James, after Coleridge. The sea was silent to us, at least, and here we are in the midst of it. It is a "going concern," and so are we, and all this adds to our interest and lends spice to the experiences which follow our actions, for a good deal, to us, depends on our behavior, and we shall not come this way again.

Fouillée is quoted as saying: "The world remains for Science a broken mirror, while Philosophy, by piecing together the fragments, strives to catch glimpses of the grand image." But the "grand image" was never more complete than now. It is becoming ever more complete, but it will never be finished, and science knows and philosophy may learn that the completed picture never was and never will be—never quite!

"No one can know the future," says Voltaire, "because no one can know that which is not."

We may conceive that in this universe of his, even the Supreme Being may feel his way through the intricacies of mutation, astronomical, geological, and biological, and through all the vicissitudes of individual free will and social clash. History is not altogether a matter of inevitable tendencies, but in part it is made up as it goes along. "History repeats itself"—almost, but never quite, else it could not hold our perennial interest. Its operations cannot be foreseen unless they are foreordained, and foreordination is the most hopeless and helpless of dogmas. The leaf has its foreordained place on

the stem because it could not possibly have grown anywhere else. If it could have grown elsewhere, it would certainly have done so. Such is the obstinate nature of leaves, for their insertion depends on the nature of their buds, and the buds depend on the inherited mode of growth of the species. But even with all this, every leaf has a bit of originality. Its place is almost fixed, never quite. But within the narrow range of what we call its law, it must confine its individuality. Almost foreordained, but never quite. When the leaf falls it has more latitude. Its affairs are not thus prearranged. The elements are just as insistent, but their coming together is temporary. The fall of the leaf depends on the coincidence of breeze and bacilli, and the loosening of the leaf from its stem. That the leaf should be devoured by bird or caterpillar is not a matter predetermined in the same sense as the form of the leaf is predestined, or the place it must assume on the stem. These matters rest on the long array of incidents which determine the nature of the species of tree producing the leaf.

All these incidents, the results of the conflict or co-operation of different forces or impulses, the universe must encounter or complete as time goes on. They are not part of the "law before all time," whatever that phrase may prove to mean.

Haeckel, the most conspicuous of the scientific apostles of monism, finds this doctrine adequate not only to meet the demands of philosophy, but to

answer the questions of science. His confidence in monism gives him equal confidence in those scientific theories which he regards as derived from it, because they seem to accord with it. These conceptions Haeckel calls "Articles of Faith." These articles of faith concern matters of science which come sooner or later within the range of human experience, and to be stated in terms of human action. By these tests of science the articles of faith stand or fall. If monism belongs to science, and these "articles of faith" are among its real corollaries, the philosophic conception must stand or fall with them. If monism cannot be tested somewhere, somehow, the great generalization has its place somewhere outside of science.

First among these postulates of monism, or "articles of faith" in Haeckel's scheme, comes the "essential unity of organic and inorganic nature, the former having been evolved from the latter only at a relatively recent period." We may admit that organic life is relatively recent, and that inorganic nature has existed longer. But we know nothing whatever of how life began. Whether life is a matter of organization and chemistry, or whether it has an element which transcends all material forces no one can really say. It is more easy to argue against any special theory of mechanism or vitalism, than to build up constructive arguments adequate to turn the scale in favor of either. As Professor Brooks has said, "We shall never know which of

these hypotheses is true until we find out." Those who begin with the thesis that "life is nothing but chemism" often end, as Driesch has done, with the belief that vital force transcends chemism, and that life is itself one of the primal forces of creation. Those who reverse this thesis, claiming that chemism includes all we know as vital force, find themselves obliged to shift their theory under the pressure of facts. No view of the ultimate nature of life is yet a finality. Only as a corollary of monism does any hypothesis as to the essence of life find a permanent resting-place.

That monism demands spontaneous generation in itself proves nothing. We believe without knowledge when we assert that life first arose through natural chemical action, the generation of living from inorganic matter. Haeckel further resolves life activity or the movement and change in protoplasm into properties shown by certain carbon compounds under certain conditions. Life in this sense is an "emanation of carbon," "the true maker of life," according to Haeckel, "being the tetrahedral carbon molecule." The "mystery of life" is, therefore, removed by placing it one degree further away from the known facts, with an area of pure speculation between. Across this area, untouched by human experience, science cannot extend itself. In science, a position which cannot be attacked on the basis of observation or experiment cannot be defended. Castles in cloudland are impregnable.

Theories impregnable can be attacked only when they can be verified, when they are made sufficiently definite to be the basis of positive predictions as to the outcome of experiments.

The long dispute as to mechanism and vitalism cannot end in a victory of one side or the other. If processes of life are included under "chemism," then "chemism" is not a perfectly simple and transparent idea. It must include all the complexities gathered together under the term vitalism. Life is so different from anything which would be inferred from a knowledge of the simpler phenomena of chemistry or physics, that it seems to call for special terms and special explanations. Hence the disposition to segregate the complex phenomena of life as vitalism. But chemical forces are adequate to produce whatever effects chemical forces can be shown to produce. "If the mystery of causal sequence is the same everywhere, nothing is gained for explanatory purposes by exaggerating it at one place and then giving it a name."

Another "article of faith" in Haeckel's system is that of the identity of matter and force. Neither appears without the other. But we know likewise that the inside of a sphere never appears without the outside, or the peach without the skin, the melon without the rind. Therefore, in each case we might argue that the two are identical. In a large sense they are, but not in all senses.

More directly subject to scientific tests is

Haeckel's claim that all chemical substances are really one, all being derived from the supposed primitive substances, protyl. Monism further demands, according to Haeckel, the evolutionary unity of all life. Still more explicitly, it demands belief in the inheritance of acquired characters in the process of heredity.

Now all these theories may be true, but until they have borne the test of action, they are not yet true. It is not clear that science is advanced by making them matters of "pious belief" or "articles of faith," before they are proved through observation and experiment.

That all ponderable matter is of one primitive stuff may be the fact. Already the atom has been subdivided into minor units. Already some forms of matter change their nature under spontaneous activity, appearing as something very different. But gold remains gold and hydrogen remains hydrogen, and most forms of matter seem neither subject to radio-active change, nor to any other form of evolution. To all tests of science there is still an impassable gap between platinum and oxygen, between radium and iron, between potassium and carbon, or even between potassium and the very similar substance or neighbor, sodium. Affinities, resemblances, and parallelisms exist, but we have nowhere among these elements found identity of substance nor identity of origin. Science cannot bridge these chasms, until a bridge is made. If we

cross over, without a bridge, it must be by some means outside of science.

In a general way, men have found out that the processes of nature are more complex than men in earlier times had supposed, while the elements concerned in these processes are often more simple. But this generalization goes no further than the facts go. Science stops where the facts stop, and speculation cannot safely proceed any farther. To every test human experience has devised, chemical substances retain their nature, their ultimate particles being unchangeable as well as indestructible. Therefore, to speak of these as forms of one substance is to go beyond knowledge. Science does not teach this. But the idea may be plausible, or even logical, as a conception of philosophy. It is quite conceivable that by some combination of primitive units, the variant chemical atoms are formed. Recent investigation may even tend in this direction, however far it may be from reaching the supposed final goal. If this conception be really truth, it must, sooner or later, be carried out into action. Lead may then be resolved into its primitive elements, and these elements may be reunited in the form of gold. "The dream of one age" is said to be "the science of the next," and when lead is really transmuted, the dream of the alchemist will become fact. Yes, but not until then, and this is the most important phase of the matter. Such transmutation is as yet no part of

knowledge. That it may seem probable or likely, or to have logical continuity with other generalizations, gives it no standing in science. The speculation on which it rests is a bold one, overbold and, therefore, at present useless.

The essential unity of life has some claim to be called a fact of science, for it can be in part inductively verified. The derivation of existing forms from pre-existing species through processes of divergence and adaptation is as nearly established as truth as any generalization can be. By the operation of variation in heredity, and variation with heredity, with the sifting of the environment, life has been split up into countless strains. By the process of selection, those strains fitted to the environment have survived, and by means of geographical and other separation, countless variations have survived in parallel series.

Again, Haeckel claims that, as an article of faith, monism demands belief in spontaneous generation. This theory has been the subject of numberless experiments, none of them, perhaps, finally conclusive. They yield negative results, and a negation rarely puts a final end to any conception. On the face of things, spontaneous generation, like the transmutation of metals, seems reasonable enough. It seems less reasonable when we get close to the facts. The one idea has been the will-o'-the-wisp of biology, as the other has been of chemistry. We know of no case in which spontaneous generation can possibly

have occurred. We know nothing of how—if ever—non-life becomes life. So far as our experience goes, so far as science can see or feel, generation from first to last is a continuous series—all life from life. We can devise no conditions under which spontaneous generation takes place, or in which it seems likely to most of us that it can take place. If spontaneous generation should take place we should have no way of knowing it. All the organisms we know have had a long history. Even the simplest moneron shows traces of a long ancestry, of long-continued cell-subdivision, a long exposure to natural selection, of many concessions to environment. We know of no living organism that does not show abundant traces of such concessions. We know of no way by which adaptation or obedience to demands of environment has been produced save by the long-continued selection of the adaptable. We know of no organism that does not show large homologies with a multitude of other kinds or species of organisms. We know of no source of homology save blood-relationship. The analogies point toward the origin of all life from one common stock, a single generation or a single individual. All this would show, not that spontaneous generation is impossible, but that we have, as yet, no conception as to the conditions of any of its occurrence. If living organisms now appear otherwise than by a process of cleavage of unit of energy from some living organism, the casting off of a germ-

cell, if living structures fresh from the mint of creation are now developed from matter not living, we should have no possible means of recognizing them. They would be so simple that we could not detect their living nature. They would doubtless be so small that we could not find them. They would consist, we may suppose, each of but a small number of molecules, perhaps but two or three. If there is truth in the suggestion of Lord Kelvin that a molecule in a drop of water is as small as a marble in comparison with the earth, we should have no way of searching for such creatures. If we cannot find them, we cannot know that they exist. If we do not know that they exist, shall we believe that they do? Or is it better, as Emerson suggests, that men should not "pretend to know and believe what they do not really know and believe"?

It may be that the fact that life now exists on the world and that geology seems to show that its condition was once such as to make life impossible, implies "spontaneous generation" as a logical necessity. If there was a beginning of life, some form of beginning was doubtless a "logical necessity." But this "logical necessity" lies in our statement of the case, not in nature. Logical necessity does not compel assent until we are able to compass all the possibilities in any given case. We know too little of the conditions before life appeared on the globe to venture any guess as to how life began.

Doubtless it began somehow, and it had a natural origin, that is, an origin with an adequate cause behind it.

The heredity of inborn characters is a matter of daily observation. The heredity of acquired characters, the hypothesis of "progressive evolution," the inheritance from generation to generation of the results of use and devise and the impact of environment on the individual, is another of Haeckel's "articles of faith." But it is not one of the certainties of science. Observation and experiment have alike failed to give it verification. That it is an "article of faith" derived from a speculative hypothesis lends it no probability whatever. Our judgment must depend on the results of human experience, tested and set in order. The matter stands exactly where it did before. It is within the realm of human experience, and by such experience it must be tested. If the doctrine is vulnerable to philosophic weapons alone, its fate is no concern of science.

The question of monism can have little actual relation to science or human life. If we cannot test the monism by observation or experiment of one sort or another, no conclusion we reach has any actual validity. If neither result nor method can be woven into the conduct of life, the question as to whether we are "monists" or "pluralists," or theorists of some other sort, becomes a matter of temperament or of individual preference,

rather than a necessity of science. Pluralism has this advantage that it occupies the field as a working hypothesis in line with the facts of experience, while monism remains unproved and logically more or less unfruitful. Pluralism, on the surface, is true, and we deal with surfaces. "The systematic unity of reality" is another definition or phase of monism. It is fine to believe in such systematic unity, but it is just as satisfactory to believe the reverse, whatever that is, for we have no way of putting any part of its system to a test. In what way would our universe differ if its realities, theoretically in unity, were actually not so?

"All realities influence our practice," Professor James quotes from Ostwald, "and the influence is their meaning for us. I am accustomed to put questions to my classes in this way: In what respects would the world be different if this alternative or that were true? If I can find nothing that would become different, then the alternative has no sense." "That is," says James, "the rival views mean practically the same thing, and meaning other than practical, there is for us none. Ostwald gives this example of what he means. Chemists have long wrangled over the inner constitution of certain bodies called tautomers. Their properties seemed equally consistent with the idea that an unstable hydrogen atom oscillates inside of them, or with the idea that they are unstable mixtures of two bodies. Controversy raged, but never was decided.

'It would never have begun,' said Ostwald, 'if the combatants had asked themselves what particular experimental fact could have been made different by one or the other view being correct.' If it would then have appeared that no difference of fact could possibly ensue, and the quarrel was as unreal as if theorizing in primitive times about the raising of dough by yeast, one party should have invoked a brownie, while another insisted on an elf as the cause of the phenomenon."

Professor James continues: "It is astonishing to see how many philosophical disputes (and we may add scientific disputes as well) collapse into insignificance the moment you subject them to this simple test of tracing a concrete consequence. There can be no difference anywhere that does not make a difference elsewhere; no difference in abstract truth that does not express itself in a difference in concrete fact; and in conduct consequent on that fact imposed on somebody, somehow, somewhere, and some when. The whole function of philosophy ought to be to find out what definite difference it will make to you and me, at definite instants in our life, if this world formula or that world formula be the right one."

The spectroscope tells us of the compositions of the distant stars, stars we have never seen and can never see, stars whose light reaches us centuries after the spreading waves of ether diverged from the star itself. Of what practical use to us to know

that Zeta Draconis has hydrogen in its atmosphere? None, no doubt, except as a factor in the broadening of our minds, the clarifying of our conception of relative values in the universe. But the methods by which this knowledge is won are intensely practical. Not alone that we use the spectroscope as well in the manufacture of steel, but rather that we use its methods in the affairs of human life. The spectroscope is one of science's instruments of precision, and precision lies at the heart of the progress of human civilization.

Men have struggled for ages over the symbolism of the Eucharist. Is it a matter of unity or of identity? Is it homousion or, perchance, only homoiousion? Who can tell at the end of the controversy any more than at the beginning? In what way does a conclusion affect our view of the universe? In what way does it affect the conduct of man? It is not necessary to follow this with further illustrations. If the motto, "*nihil nemini nocet*," "nothing hurts nobody," ascribed to a certain cult of faith-healing, is valid, then nobody need worry about nothing, and Science can turn her attention to realities. For, somehow, somewhere, or some when every reality will leave its mark on human conduct.

Referring again to the conception of monism, science can have no quarrel with it, except that it can make nothing definite out of it. Monism does not appear as a proved or partly proved or even as a

plausible fact, nor is it clear that it constitutes an hypothesis which, being put to the test, will conduct us to the things we want to know. If, when put to the test of experiment, it yields, as inductive truths, the scientific articles of faith associated with it, the philosophy would be justified by its results. Theories of organic evolution have justified themselves in this fashion. But thus far monism stands in a world apart. The same is true of the conception of pantheism, as related to the world of action. It is not easy to conceive of monism or pantheism as being true or false. We need feel no prejudice against either. They lend themselves to poetry. They appeal to our emotions. In Haeckel's own words, used in reference to conventional religious conceptions, "Such hereditary articles of faith take root all the more firmly the further they are removed from a rational knowledge of Nature and enveloped in the mysterious mantle of mythological poesy."

It is to us as poets, rather than as men of science, that these doctrines appeal. By and by in the circuit of philosophic thought, the present resistance to these ideas may be turned again into devoted reverence for them. For none of all the philosophic doctrine, brought down as lightning from heaven for the guidance of plodding man, seems more uplifting than that of the unity of existence and the universal presence of deity. None is less likely to be trampled under foot in the rush of common life.

But shall we give these doctrines belief? Not if we have to accept any of their corollaries or derivatives on any terms except on their own particular evidence. Haeckel recognizes clearly enough the difference between fact in hand and fact hoped for. He uses the term belief for "hypotheses or conjectures by which the gaps empirical investigation must leave in science are filled up." "These," he says, "we cannot, indeed, for a time establish on a secure basis, and yet we may make use of them in the way of explaining phenomena, in so far as they are not inconsistent with a rational knowledge of Nature." "Such rational hypotheses," he says, "are scientific Articles of Faith."

Gladstone somewhere uses a parallel expression. He speaks of certain doctrines as not yet a part of knowledge, yet so well supported that they may "bear the weight of belief." Belief, then, is not what we know, but what we logically hope to know, in view of human experiences available to us.

It would not seem necessary to take so large a term as faith or belief for working hypotheses confessedly unproved or transient. The phrase "make-believe," used by Huxley in similar connection, fits the case better. As men of science we cannot believe any hypothetic "articles of faith" not resting on scientific induction. Dealing with my own experience, and that of the race, I ought not to say, "I believe," when I cannot say "I know." I should not believe when I cannot trust. I should

put off the livery of science when I enter the abode of the Delphian Oracles.

That those "articles of faith" named by Haeckel are necessarily derived from monism is certainly open to doubt. Monism as a philosophic conception can have no practical corollaries. Its conclusions are all involved in its definition. If its definition involves nothing that can be tested by experiment or wrought into action, it is outside the field of knowledge. Doubtless monism would still flourish were all its "articles of faith" disproved. If so, it has no part in science, for science deals with classified realities in human life. It belongs to philosophy and to poetry, both legitimate activities of the human mind, although not primarily concerned with knowledge.

If, however, monism rests actually on human experience it must be tested by scientific methods. Until it is so tested, however attractive or however plausible it may seem, it has no working value. There is no gain in giving it belief or in calling it truth. Still less should we stultify ourselves by pinning our faith to its postulates as to matters yet to be decided by experiment, and to be settled by human experiment only. Haeckel says, for example: "The inheritance of characters acquired during the life of the individual is an indispensable axiom of the monistic doctrine of evolution. Those who, with Weismann and Galton, deny this, entirely exclude thereby the possibility of any formative in-

fluence of the outer world upon organic form." Here we may ask: Who knows that there is any such formative influence? What do we know of this or any other subject beyond what, in our investigations, we find to be true? When was monism a subject of special revelation, and with what credentials does it come, that one of the greatest controversies in modern science should be settled by its simple word?

We must beware of paths to knowledge as to matters of fact, which save us the labor of inductive verification. As Emerson observes, we should avoid "all short cuts to truth as we would shun the secrets of the undertaker."

Nearly all of the arguments in favor of the heredity of acquired characters, as well as very many of those in favor of the opposed dogma of the unchanged continuity of the germ plasm, are based on some supposed logical necessity of philosophy. Logical necessities are valueless in the light of fact. Desmarest once suggested to the contending advocates of Neptunism and Plutonism to "Go and see." When they had seen the action of water and the action of heat, as he had seen them among the volcanoes of Auvergne, the contest was over. Argument and contention had vanished in the face of fact. To believe without foundation is to discredit knowledge. Scientific "confessions of faith" show a zeal to believe which cheapens the power to know. Greater than the courage of one's

convictions may be the courage of patience where convictions are not yet attainable.

"Science," says Richard T. Colburn, "does not concern itself with teleological suppositions. It is reluctant to resort to any of them to explain the observed cosmos. It prefers to listen in neutral attitude to the rival philosophies—theism, manichaeism, atheism, monism, spiritism, or materialism—but it is at least equally well equipped to pass judgment on such speculations as their advocates."

Again, if we are to allow the revision of the generalizations of science by the addition of acceptable but unverified doctrines, we must allow the right of similar revision by rejection. Mr. Wallace, for example, would be justified in adding to the certainties of organic evolution his idea of the special creation of the mind of man while the body was separately developed under natural law. The old notion of the separate existence of the ego, which plays on the nerve cells of the brain as a musician on the keys of the piano, would still linger in psychology. The astral body would hover on the verge of physiology and the disembodied soul still go on its pilgrimages to Devachan.

I have a scientific friend who finds it necessary to exclude by force from his biological beliefs all that is unpleasant in the theories of evolution. And he has the same right to do this that Professor Haeckel has to insist that any scientific beliefs, for

which science has yet no warrant, are a necessary part of the orthodoxy of science.

For Haeckel, one of the greatest of teachers, a man of fine strong personality, is sometimes a bit dogmatic. In his treatment of monism, he is not content to speak for himself, asking tolerance by tolerance toward others. His belief is no idiosyncrasy of his own which he keeps to himself. He speaks for all. Every honest, intelligent, courageous scientific man, he tells us, so far as he is truthful, competent, and brave, shares the same belief. His confession of faith is nothing if not orthodox. He says:

"This monistic confession has the greater claim to an unprejudiced consideration in that it is shared, I am firmly convinced, by at least nine-tenths of the men of science now living; indeed, I believe, by all men of science in whom the following four conditions are realized: (1) sufficient acquaintance with the various departments of natural science, and in particular with the modern doctrine of evolution; (2) sufficient acuteness and clearness of judgment to draw, by induction and deduction, the necessary logical consequences that flow from such empirical knowledge; (3) sufficient moral courage to maintain the monistic knowledge so gained against the attacks of hostile dualistic and pluralistic systems; and (4) sufficient strength of mind to free himself, by sound, independent reasoning, from dominant religious prejudices, and especially from those ir-

rational dogmas which have been firmly lodged in our minds from earliest youth as indisputable revelations."

Against such assumption science may protest. We have nothing against the doctrines save that they are not yet proved true. In themselves, as I have said, they are attractive. One may naturally feel a hopeful interest in wide-reaching theories which seem plausible, but are still unproved or unworkable. This is, however, not "belief." It is rather open-mindedness, open to negative evidence as well as to positive.

As science goes wherever the facts lead, so science must stop where the facts stop. It cannot add to its methods the running high jump, nor place the divining rod with the microscope, crucible, and calculus among its instruments of precision. Beyond the range of scientific knowledge extend the working and the unworkable hypotheses. Beyond the confines of all these extend the universe of the mind, the boundless realm which is the abode of philosophy. We must ask of each hypothesis: Is it capable of being put to the test? Is it fruitful of results when tested? If tested and fruitful, such hypotheses belong to the category of science, and nothing is added to their dignity or respectability by making them into dogmas or "articles of faith."

The primal motive of science is to regulate the conduct of life. This is in a sense its ultimate

end, for it is the first and the last function of the senses and the intellect. "Still men and nations reap as they have strewn." The history of human thought is filled with the rise of doctrines, laws, and generalizations, not drawn from human experience and not sanctioned by science. The attempt to use these ideas as a basis of human action has been a fruitful source of human misery.

"Consistent materialism," says Dr. William E. Ritter, "consistent idealism and occultism are one finally in their abandonment of experimental knowledge."

"Better any fragment of cerebral philosophy," says William Lowe Bryan, "which is true, though by itself unable to tell what any one is to do, than a study of human character which tells every one what to do, but is not true."

The advances of science are all made along indirect lines by the comparison and extension of experiences, rarely by striking out directly toward the final result. For no one can foretell in what direction the final result may lie.

Science bids us follow the line in which our definable needs for knowledge, practical and theoretical, may urge us on. Conceptions thus obtained will of necessity be livable, either as guides or as warnings in the conduct of life. The truth is found in the tested induction from human experience. Other conceptions, deductions, or imaginations do not much matter. As science advances these no-

tions are left along the road, impedimenta, to be later picked up and classified by history, in whose hands they acquire a fresh interest, as human documents in the intellectual progress of the race.

IV

REALITY AND ILLUSION

"Whoever will contribute any touch of sharpness will help us to make sure of what's what and who's who."—WILLIAM JAMES.

"A few clear ideas are worth more than many confused ones. A young man will hardly be persuaded to sacrifice the greater part of his thoughts to save the rest, and the muddled head is the least apt to see the necessity of such sacrifice.

"It is terrible to see how a single unclear idea, a single formula without meaning, lurking in a young man's head, will sometimes act like an obstruction of inert matter in an artery, hindering the nutrition of the brain, and condemning its victim to pine away in the fullness of his intellectual vigor and in the midst of intellectual plenty. Many a man has cherished for years as his hobby some vague shadow of an idea, too meaningless to be positively false. He has, nevertheless, passionately loved it, has made it his companion by day and by night, and has given to it his strength and his life, leaving all other occupations for its sake, and, in short, has lived with it and for it, until it has become, as it were, flesh of his flesh and bone of his bone; and then he has waked up some bright morning to find it gone, clean vanished away like the beautiful Melusina of the fable, and the essence of his life gone with it. Who can say how many histories of circle-squarers, metaphysicians, astrologers, and what not, may not be told in the old German story?"—CHARLES SANDERS PEIRCE.

"Better not to know so much than to know so much that is not true."—JOSH BILLINGS.

THE word Truth is used with many different meanings. A description of an isolated fact is, in one sense of the word, a truth. A correct account of any sense-impression, stated in terms of common human experience, is a truth. Again, a truth may be a judgment of an ascertained relation between one object and another, or it may be more than this, an exact quantitative estimate of such relation. If the relation be one of cause and effect, the truth becomes a generalization. If the generalization be adequately verified, involving a multitude of facts or of truths of a lower rank, it becomes in the high sense a truth. A truth of the higher order is of necessity incomplete, and our statement of it must change with increase of knowledge. It is said that "Nature abhors a generalization" as once she used to "abhor a vacuum." This is because she must always add to it, showing that it is forever incomplete. It is of such lofty truth that Huxley observes: "New truths begin as heresies, and end as superstitions." Men doubt the new truth at first, because it is strange and incomplete. Later, the incompleteness becomes their most cherished quality.

In the same vein, Ibsen remarks: "Truths are by no means the wiry Methuselahs some people think them. A normally constituted truth lives, let us say, seventeen or eighteen years, at the outside twenty years, seldom longer, and truths so stricken in years are always shockingly thin."

Apart from these meanings of truth is the con-

ception of the ultimate completed actuality of the "Ding an Sich," the perfect truth of which we read sometimes, but to which we never attain, and to which no meaning can be attached.

The test of objective truth is found in the conduct of life. By the verification of action we may separate truth from illusion. Every characterization or description of reality points the way to some line of conduct. Persistent action, based on error, is dangerous, because it leads into unforeseen conditions. An unforeseen condition in itself is an evidence of inadequacy of knowledge. Every unknown condition has its pitfalls which disappear in the daylight of knowledge. "Truth in science," says James, "is what gives us the maximum possible sum of satisfactions, taste included, but consistency both with previous truth and with novel fact is always the most imperious claimant. Truths emerge from facts, but they dip forward into facts again and add to them, which facts again create or reveal new truth. The facts themselves meanwhile are not true. They simply are. Truth is the function of the beliefs that start and terminate among them." If the supposed truth does not mean something in particular, action by bringing about results cannot afford any test of it. It evades the issue by remaining vague. To have a definite meaning, thus admitting of verification in action, our supposed truth should stand as an answer to some definite question, promoted by some definite interest of ours.

This interest may be purely theoretical, or it may have some definite purpose or utility. And the action which tests it should have some definite purpose. Activity, such as Taine imputes to the people of Paris, that of "ants on whom pepper has been sprinkled," will not bear "the name of action."

With conditions familiar and simple, the mind draws conclusions, fairly correct as far as they go, from the details given in ordinary immediate sense-perception. We ordinarily show common sense when dealing with the squash, and we take no risk in following the promptings which our commonplace everyday knowledge of the squash suggests to us. But objects more complex and of unfamiliar character often sorely vex our common sense. To find our way to clear comprehension and wise action, we must ask the tested and co-ordinated common sense of the race which we call science to come to our rescue. Our immediate misinterpretations of the superficial aspects which objects present to us we call illusions. False conclusions arising from defects of reasoning we may class as delusions. The way out from illusion or delusion alike is found in the test of action. When the truth in any theory is exhausted, it is no longer available in action.

In ordinary life, we are everywhere beset by illusions and delusions of every grade and order. In this chapter, we may consider some types and instances of these, with, perhaps, a glance at the lesson each one may teach, and a final look at the

marks by which errors of perception, errors of judgment, and resultant misdirection of action may be detected and avoided.

One of the simplest of errors is that arising from relative motion. You are in a railway train which is waiting on a side track. Another train comes in sight; its motion seems transferred to your own train, but in the opposite direction. This motion continues until the other train has passed. It ceases suddenly, when you can almost feel the jolt of its stopping. But from other observations which you trust, you know that your own train has been all the time at rest.

A delusion of this sort is so simple that it is quickly corrected before it passes into action. But we may conceive of conditions under which even this would have its dangers. Let us look at some others. The story is told of a merchant who, smacking his lips over a glass of brandy, said to his clerk: "The world looks very different to the man who has taken a good drink of brandy and soda in the morning." "Yes," said the clerk, "and he looks different to the world, too." Now, which is right? Is the world different that it looks brighter? The test is found in action, perhaps in the muddled outcome of not taking the world as it really is.

Ambrose Bierce tells the story of a man who visited a naturalist in San Francisco, and remained over night as a guest. The naturalist was a student

of living snakes. When the visitor retired at night he looked under his bed and saw a great coiled serpent, who watched him with glittering eyes. It is believed that a snake's eye has a wonderful power of fascination. Such it proved in this case. For in the morning the naturalist found his guest dead, kneeling on the floor, his open eyes staring in horror at the thing under the bed. This thing was the stuffed skin of a blacksnake with two shoe-buttons for eyes. It was suggestion, not the serpent, which had charmed him to his death.

A ship once landed on a little palm-belted island in the Pacific Ocean. Its passengers brought with them the materials for a house, which they set up, to the surprise of the natives, who had never seen a wooden house before. They put in it blankets and cooking utensils, and, after a day or two, they set up near the house on a solid foundation a long tube through which they gazed by turns at the sun. After watching the sun for a single day, they hastily returned to the ship, carrying the long tube and the blankets, but leaving the house and, apparently, everything else of value on the island. The delighted natives took possession of the house, and they hold it to this day. And they look in vain for the return of the foolish people who left it there.

Some time after this, on the granite coast of Labrador, the same thing happened again, but with this variation, that the tube the men looked through seemed to dim the sun. When everything was in

place, the sun, little by little, grew dark, and was hidden, as if by a lid drawn over it, for the space of an hour. Then the cover was slowly drawn away. The sun came out as before. Thereupon the men went back into the ship, carrying the tube with them, but leaving their house and almost everything else they had brought. And the people took possession of the house. But nothing in particular happened afterwards, save that the air grew hazy with the smoke of burning forests.

Along the coasts of Sinaloa in Mexico people are engaged in digging for buried treasures under the direction of a certain woman in San Francisco. She has never been in Mexico herself, but she is reputed to have the power of seeing clearly remote or hidden objects in any part of the earth. There is an old legend current which tells that a pirate ship, hard pressed by the Mexican soldiers, landed on the Cape of Camarron near Mazatlan, where the buccaneers hastily buried a vast treasure of silver, after which they all fled. A certain man is engaged to-day in boring a tunnel into solid lava to find the treasures thus laid away. This woman, in a shabby Sacramento Street boarding-house, claims to see the inner secrets of the mountains, and directs all these operations. For this, we may assume, she is duly, doubtless adequately, paid. But what will be the reward of the man who digs the tunnel?

A man takes a forked rod of witch-hazel, and, going over a tract of land, feels the fork twist

downward at a certain point. There he digs and finds a well of living water. If there is much water the rod will turn the more vigorously or even turn the other way. Another man uses the same rod and finds coal, iron, gas, or building stone—whatever he may seek. To do this he has only to attach to the branch of the rod a small fragment of that which he would seek. Thus a dime, if one seeks for silver, a five-dollar gold piece if one looks for gold. In California, where there is no witch-hazel, the mountain willow serves the purpose best, because there is "water in its make-up." But even the madroño or the azalea can be used in an emergency. A man once tried to bore for gas on a certain tract of land in southern Indiana. He engaged an operator with a witch-hazel rod. But the wizard, finding the territory too large to be gone over step by step, makes a little rod, parlor size, and, taking the map of Vanderburg County, in which the city of Evansville lies, goes over it with the instrument. The result is just as satisfactory. The rod indicates a point on the map, the well is bored in accordance with the rod's directions. Plenty of gas is found, and this is held to prove the accuracy of the method. As Lord Bacon once observed, "men mark when they hit, but never when they miss."

Now that radium is discovered the witch-hazel rod becomes the chosen medium of radio-activity. By its influence buried cities are now discovered as

well as hidden streams of water. What of the man who tries to divine the material of which a star is made? Taking a tube of metal with lenses and prisms of glass, he turns it toward the star. Speedily, by means of lines and streaks on the prism, he gets his answer, and the composition of a vast sun, so far away that the light which left it in the days of Cæsar has never yet reached us, he describes with confidence. Then, turning his tube on the Pole Star, he finds that it is made of two stars, one a great sun which we can see, and the other a smaller sun which we have never seen, and which we can never see. What of all this? If the spectroscope tells the truth where it speaks in such bold fashion, may we not trust the witch-hazel, too, with its more modest claims?

An astronomer traces the course of a far-off planet and finds that its orbit bends a little from a perfect ellipse. From this he concludes that another planet must be coming near it and attracting it. He sets to work to determine the size of this other planet, and the place in which it ought to be. Having finished his calculation, he turns the telescope toward this place, and the expected planet is there. If the mathematician, through his instruments, be thus sensitive to far-off matter in infinite space, may not the clairvoyant, through her sensitive-projectile astral body, be equally sensitive to a mass of silver?

Once in a trance a finely organized adept or

"medium" wandered in her astral body through the open belt where the souls of the planets wander at will. While there, she heard the comet-shriek, the cry of a lost planet soul, "the most terrible sound that rings through the heavenly spaces of the zenith." Is not her testimony to be received with that of the others who have traversed the mysteries of the abysses of space?

From shore to shore across the Atlantic Ocean runs a metallic cable. By means of electric batteries, magnets, and sparks, a message is conveyed from one end of this cable to the other. Messages have been sent so many times that the most skeptical cannot doubt the fact. By such means a wanderer in any part of the world may be found and called home, or, if need be, sent still further on. Most of us have seen this done and all have heard of it. Because it has grown familiar it seems real to us, and its mystery is dissipated. But why use the metallic cable at all? What occult power lurks in metal? Why must we work always on the material plane? Why not use the air? And, indeed, the air has been used, and with wonderful success. The air is full of marconigrams, and the "grams" or messages from Poulson's latest invention, the creatures of wireless telegraphy and wireless telephony. But why should we stop here? Why not use the invisible ether, along which so many forms of energy are propagated? Indeed, why not use the boundless sympathy of life? In southern Eu-

rope there is a large species of snail which runs up and down the cabbages, feeding on their leaves. Like other snails, it is very fond of its mate. At least, it is so claimed by its promoters. It, too, has been used in telegraphy. Leave your sweetheart in Italy when you come back home, but leave her with a large piece of cardboard and take another like it for yourself. On each of these write a number of sentences of sentiment and affection—quotations from the poets, the finest possible to your literary taste, Browning, Tennyson, Wordsworth, or the latest topical song—any of these will do. Then take for yourself one of a devoted pair of snails, leaving the other with her. At an agreed moment (standard time, making allowance for differences of longitude) place your snail upon the card and she will do the same with hers. Your snail will creep to any sentiment you choose as you direct it. Hers, left free to move about at will, follows the same course its mate has chosen. Thus the fondest messages can be sent across the ocean. The last word of the snail in America, "All's well," or "*Non ti scordar di me*," can be made to echo sweetly on a far-off shore. Here we have the *Parasilenic Telegraph*, no invention of the present writer, but the actual work of an ingenious "psychic adept."

But why use the snails? Surely their cold slimy bodies are not more forceful than the throbbing heart and eager brain of man. Surely they are

not more sensitive than his astral form. Let the snails go. They belong to the crude beginning of astral science. You have only to sit in your room alone in darkness, and by intense thought and irresistible volition you may set the whole ether of the world in palpitation with your dreams and desires.

To your thought the "sensitive" you love will respond. Her astral brain will register your ether throbs. "It is my wish": that is enough for her. But you can do more than that, if we may trust the records, already published. Your own astral body may be sent across the ocean on the tremulous ether and it will appear to her in her dreams or as part of her realities. While the absence of this body may be a slight inconvenience to you, for you must sleep or suffer while it is gone, it will be a source of joy to her. It may plead your cause for you in a way which protoplasmic bodies can never imitate. That this is not imagination or illusion we have abundant testimony, if the word of man unverified by instruments of precision is convincing to you. Thoughts and ideas, we are told, may be "impressed on consciousness in solid chunks without waiting for words or clicks or other means of expression, or for a lightning train to convey them," and there are hundreds of records to show how this is done. Stranger things than this are happening every day, and we think nothing of it. Messages fly through the air, to be recorded on sensitive instruments of

precision. Even the very words themselves can be caught and brought to life, the very sounds being reproduced.

But you do not stop with the expression of your power over the ether and the astral messages it is the function of the ether to carry. You may exert control over matter itself. Mind is matter's king. Matter is the vassal of mind. Then under the force of mind, matter will change or vanish. Recent experimenters claim that by gazing at a photographic plate in the dark, an impression can be made on it. This is the mind flashing out through the human eye. Then whatever is in this "mind's eye" should appear on the sensitive plate of the camera. But greater deeds than these were done long ago, and to my mind they are told in records better authenticated. The sages relate that Odin wished to secure the golden mead of the giants that men might drink it and be strong as they. After great labors he came to where the mead was kept. He found that the giant Suttung had concealed it in a great stone house, to which he could get no key. So Odin and his friend the giant Bauge sat down before the house and gazed at its walls all day. Thus they made a small hole in the rock through which Odin entered by changing himself into an angleworm, and carried the golden mead away in triumph.

There was once a California nurseryman who had a good business and was making money, as the

phrase is. So he put aside all the fruit trees which would sell and devoted himself to making others which would not. Each year he trimmed his plums and apricots and lilies and poppies, taking away the pollen which nature had provided, and putting it on flowers to which it did not belong. Each year he planted thousands of seeds of many kinds, and when the plants came up, he pulled up nearly all of them and burned them in a great bonfire. Meanwhile he made no money, and lost little by little all that he began with. Then men began to see that all fruits and nuts and flowers changed under his hands. The plums grew very large and very juicy, red, blue, and white, and more on the tree than men had ever seen before. The lilies and the poppies and all the other flowers grew larger, the cactus lost its thorns and the onion its odor, the chestnut bore its fruit with its second crop of leaves, and all things which he touched turned into something handsomer or with finer fruit. And every year he pulled up almost everything in his garden and cut down almost everything in his orchard, and laid all in windrows of which he made great bonfires. And foolish people, seeing his work, tasting his fruit, called him a wizard, and came from far and near to see him wave his magic wands. But there were some who saw in his operations merely science in action, the working out by man on a small scale of the operations which on a large scale the scientific men know as selection

and segregation of the products of variation and heredity.

On an island in Alaska, known as Etolin, a good man established himself some fifteen years ago, to risk his fortune on a law of salmon life which he regarded as a conclusion of science. The facts are as follows: The red salmon of the Pacific are hatched in the streams above the lakes. Spending their first summer in the lakes, they run down to the sea, remaining there until they are mature—at four years old. Then they ascend the streams again, and cast their spawn in the brooks above the original lake. After once spawning all of them die. These statements are all accepted matters of fact, the object of a thousand observations. But to these laws of salmon life, this man added one more: Each salmon returns to the actual stream where it was actually hatched. Fishermen believe this, and the return of thousands year by year to the same place seems to substantiate it.

So this man on Etolin Island reasoned to himself in this way. The rivers of Etolin have no red salmon. They are barren streams. This is because no red salmon have been born there. I will gather salmon spawn to stock these rivers, and I shall be made wealthy by the return of the salmon. I cast my bread upon these waters, and after four years it will return. Four years he waited, each year stocking the Etolin streams anew. In four years no salmon came. He was sure of the story

of their homing, so he changed his theory as to their time of maturity. It must be five years, six years, seven years, ten years, instead of four. And the fish hatchery on Etolin remains, and the Etolin streams are barren still. There are no lakes on the Etolin streams, and we know that the red salmon never runs where it will find no lake. The homecoming of the salmon seemed to the good man on the island as sure a conclusion of science as their four-year period of maturation. Who shall now decide, since these conclusions have thus met at cross-purposes, which of them was the mistake? Who shall say that the time is ripe for a decision?

There was once an old white-haired man who came to an assemblage of scholars in the city of Bloomington, in Indiana, bringing with him two bars of wood connected by bands of iron. Fifty-three years before he had left his home on the bay of Quinté, in Ontario, to show these bars to the world and to give to mankind what it never had before, control over "The Unconditioned Force of the Universe." This force through this little machine would "revolutionize human industry, economize human labor, and relieve human want." "Gentlemen," said the old man, "I gave up the free and easy life of the Canadian forests, I sought my home among the dwellers of cities, I have sacrificed fifty-three years of my life upon the altar of my desire to benefit mankind. In three weeks more my invention will be perfected, and through these

bars the unconditioned force of the universe will do its works for you and for me. The time has gone by," he said, "when the recognition of my principle would have pleased my ambition. I love my race, and I wish to do them good." Two years more went by, the unconditioned force lacked but a few days—just one more week—of accomplishment, and in that week the old man died in the poorhouse of Monroe County, Indiana, and in the dust and cobwebs in an attic of a neighboring college the model of the machine to be controlled by the unconditioned force of the universe still awaits the touch which for the first time shall make it run. There were some who called the old man a "wizard," and some a "philosopher," and because fame has forgotten his name, I speak it here—Robert Havens. And in both these cases, and in all cases, what is our test of truth?

Not long ago, on the plains of Texas, by order of the government of the United States, tons of gunpowder were exploded. A great noise was made, the smoke arose to the skies, and then all was as before. The purpose of this was to produce rain under conditions in which common sense said rain was impossible. While these conditions remained there was no rain, but the wisdom of the experiment has the official stamp of the United States. Who shall say that it was not wise—that the experiment should not be tried again, and yet again?

A few years ago, as I remember, some enterprising men had bought the dry bed of a river in southern California. It is filled with winter floods in the rainy season, while in summer it is white with granite sand and barren stones. At best its boulders can only produce a scant growth of chaparral and cactus. Yet when it was announced that a city was to be built on this land, men grew wild at the thought. All night they stood in the streets of Los Angeles, each to take his turn in buying its town lots. The sense of great wealth was in the air, and even the wisest were carried away by it. The "millionaire of a day" exerts a fascination on his brother millionaires, akin, perhaps, to the charming of a snake. An "obsession" comes from within, not from without.

In Orange County, in California, there is a religious sect which finds the old Bible of our race, the Bible of Moses and Job and Jesus and Paul, an outworn book, no longer fitted for the aspirations of man. This Bible is still tinctured with the gospel of selfishness, for it recognizes private ownership of land, and goods, and men. "To honor thy father and mother" implies special ownership of them, and the higher life demands that there should be no respect of persons. There can be no personal claims of any sort if all are to be as "angels in heaven." Its command "thou shalt not covet thy neighbor's goods" implies the neighbor's ownership of material things, a relation which must

degrade all who submit to it. "To render unto Cæsar the things which are Cæsar's" is an outworn recognition of powers that be but which ought not to be. Clearly a new bible is needed, and one of the members of the sect sat down by a typewriter (presumably not his own property) and wrote a bible. It was not his own composition, but that of the Almighty, for the writer simply lent the hands with which divine power did the work. As his fingers played over the Remington keys, he thought of anything or everything except his writing. The result was the book of Oahspe, the Bible of this new dispensation, the story of the lords of Atmospheria and their struggles with the greater kings and fates, to which all men and lords are finally subject. And in the long run the Fates get the better even of the kings. And the name of the book arose naturally. One looks up to Heaven, and he says "Oh," then he looks down to earth and says, "Ah," and between Heaven and earth is Spirit,—Oahspe!

In the City Park of San Francisco is the wooden image of some monstrous creature carved by the Indians of Queen Charlotte Sound to express some phase of their mystic devotions. This image was stolen by a Norwegian sailor. Its makers resented its loss by a series of incantations so horrible that they took effect in the image itself. The idol came to San Francisco, bringing sickness, shipwreck, or failure to all who touched it. Even now, while it rests on a shelf in the Park Museum in apparent

quiet, its evil power is shown at night in the smashing of vases and the overturning of bottles. Something of this kind takes place whenever the image is left unguarded. A man who had charge of it for some time avers that one night the creature rose up in living form and seized him in its clutches, and only by the most violent efforts could he make his escape.

The daily papers announce that Madame de Silva, a prophetess and seer of visions, seventh daughter of a seventh daughter, born with a caul, is prepared to diagnose all diseases from the examination of a lock of hair; Wong Chang, the Chinese doctor, is prepared to do the same without the hair and asking no questions. How does this differ from the power of Cuvier to draw a bird from a single claw, or that of Agassiz, who could restore a whole fish from one scale?

There is said to be a great law of human society, called the "Law of Equal Access." Because man must live by the products of the soil, and because the earth is the sole source of wealth, all men should, in justice, have an equal access to this source of wealth. To this end, all private ownership of the soil should be abolished, must be abolished, and, with it, poverty and all its train of evils will be abolished also. The best way to do this is apparently to throw all burdens of taxation on the rent of landed property, for thus all privately accruing land values may be pressed out of existence.

Then any man could help himself to the earth in such measure as might please him, knowing that whether with much or little, he would, so long as he should pay his tax, be working his fellows no inequity by his private occupation. But there are immense differences among soils, as to productivity and availability, which make their rentals differ. In putting the theory to the test of action it also appears that there are like differences, and as great, among men. With some the earth smiles and puts forth a thousand fold. With others, not even a stalk of corn or a thicket of weeds can be made to grow. The trees which depend solely (as man does not) on *immediate* access to the soil, never yet have developed a law of *equal* access to it. The more favoring are the conditions for the law of equal access, the further seems the law from actual achievement. There are some who, thinking of these things, declare that there is in fact no such law of equal access, and that the earth belongs to him who can hold it and can coax it to its highest productivity. And there are still others who say that any law is only an expression of what is, because if it could have been anything else it would have been so. And in the view of men of this sort all social institutions must change and pass away, for the social structure is but a complex of the individual men that make it up. By what test, then, shall we judge this law of equal access as a cure for poverty?

It is claimed by many good men that "all men

are born free and equal." But this equality does not appear in society as we know it, except possibly in the cradle, and certainly in the grave. For this reason other good men struggle for equality more real and far-reaching, which shall exist in that period of life when it shall be most appreciated. To this end, men have grouped themselves into societies where there shall be equal voice, equal enjoyment, equal access to capital, equal exercise of power, where each man shall serve according to his power, and each man should receive according to his needs. But that in the struggle of life thus far these societies, one and all, have gone down—this we must concede. Equal voice is found only among the dumb, equal enjoyment only among the joyless, equal power only among the powerless, equal access to capital only among the hopelessly impecunious. In human experience, to render to each man according to his needs demands a very rigid objective decision as to what these needs legitimately may be. To give all men an equal voice in this matter is to fill the air with unclassified vociferations. No man ever had his needs supplied without needing a little more. Even the hermit in the desert caring only for piety will yearn for more. On the other hand, such is human nature, some men will rather talk than work, and in all communities in which individual effort is merged in social responsibility, a few do all the work. The rest, according to their license, fall short of doing

according to their power. When drones and workers have equal access to the honey cells, the drones at last make way with most of the honey. Among men—not bees—under such conditions one by one the workers leave their work to swell the ranks of the drones.

It is certain that the abolition of poverty means the happiness of the people. If all men should do two hours of productive work each day, poverty would be abolished. What, then, more natural than for a few hundred kindred spirits to stand together to work for this beneficent end? If in one community poverty could be abolished, why not in all others? If we say that human nature is the gate that shuts us out of heaven, is it not evident that human nature is itself the product of conditions? Is it not our poverty that makes our dispositions poor? When it is said that "poor folks have poor ways" must we not answer that these ways will be changed when poor folk cease to be poor?

Admitting the failure of any particular venture in co-operative life, with all for all, and nothing for the individual which all do not share, we may ask what does this prove? How many New Harmonys and Icarias and Altrurias, how many Kaweahs and Bellamys and Brook Farms are necessary to disprove the theory of human perfectibility through withdrawal from competition? How many years shall we wait at Etolin for the return of our salmon? How do we know that some un-

known, unmeasured force may not be still in reserve to make a full success of our final venture? But human life will not let us wait too long. We must act, somehow, and do the best we can. The answer of the centuries comes too late for us. We must "believe and venture" and risk the chances.

At Denver not long ago a man, with the beard of a saint, insisted that he had the gift of healing. A wild hermit from the plains, some called him crazy and some called him a prophet. But the gift he had, or seemed to have, and thousands of sick people and well crowded around him to be touched and healed. He could not touch them all, so he blessed their handkerchiefs, and his power passed over to them. Men and women whose ills gallons of patent medicines had failed to assuage were healed at once by these pieces of soiled cloth. And testimonials such as they had once written for these same medicines, they now freely wrote for him. And wherever he went, disease vanished before him.

But, after all, is there such a thing as disease? Surely man "made in the image of God" is made in the image of perfection, and what is perfect cannot be marred or destroyed. May not disease be the greatest of illusions? May not all pain be a nightmare dream from which we should escape if we were once awakened?

Many a school of healing has been based in one

way or another on these propositions. In a hundred different ways at a hundred different times men and women have found that they could heal pain by the suggestion that pain does not exist. If pain is disease, then shall we not heal all diseases in this way? But some say that pain is not a disease, only a warning that disease is present or coming. Pain is the signal that something is going wrong in the mechanism of the human body. The signal may be unnoticed, it is claimed. We then feel no pain, but the injury remains, for it is the cause of the pain and not the pain itself. By persistently turning the mind away from these signals of distress sent up by the bodily organs, we may come at last to be incapable of receiving them. We are then free from pain, and our minds may be filled with a sweet serenity satisfactory to ourselves, and edifying to others. Now, in all this what is true? Are we ill when we feel pain, well when we do not? Or do we feel pain because we are ill, and does the illness pass when our feeling is gone? May it not be true that this is a dangerous and selfish serenity? If it does not mean the checking of disease, but only the closing of our eyes to its ravages, then have we really gained anything? To turn from pain is to turn from all outside impressions. It may be claimed that to close the mind to the information given by the senses is to destroy reality, to make activity impossible, to cease to do our duty in the world. This is to cease to

grow and to become a burden to our friends and a cumberer of society. There is nothing more noble than serenity amid trouble and distracting effort. There is nothing more selfish than the serenity which is bred by immunity from pain. But to many people, existence without pain, without sensation, and without action, represents an ideal of the soul. It is not alone faith in a theory of disease or a theory of non-existence which may produce this result. Faith in a celery-compound, an electric belt, or a mud idol may produce the same sweet serenity, the same maddening indifference to all that is real or moving in life. The walls of certain churches in Mexico are covered with the offerings and pictures of those who were saved by their vows or by appeals to some saint. "But where," said Lord Bacon, long ago, "are the pictures of those who were lost in spite of their vows?"

It is true that to cultivate a cheerful temper, to look on the bright side of things, to laugh when we can, and be hopeful under all conditions, is good for the body. The food is better assimilated, the blood runs faster, one can do more and better things, and come in closer relations with the realities of life. But conversely, when one meets most manfully the needs of life, his pulse beats more quickly, his brain works better, his liver gives him less trouble, and he is naturally cheerful and hopeful. The cheerful man does not dodge pain, he overcomes it. He does not selfishly shrink from reality

and turn to introspection and dreaming. He faces the world and makes it his own and takes manfully the pain his efforts cause or which in the progress of life he cannot avoid.

It is possible to go much farther in the direction of the banishment of pain through the thought that pain does not exist. Then take more pain and it will become at last an intense pleasure; when the mind is in the grasp of absolute torture, it is possible for the brain to feel it as with spasms of absolute delight. It is not easy to do this, but can be produced by excessive belief in the unreality of common things. The brain half-maddened by pain is open to suggestions from other maddened brains till a fierce wild ecstasy is the final result. This fact explains the strange rites of those sects of self-destroyers which rose in the Middle Ages, the Flagellantes, the Hermanos Penitentes, and the rest. Even yet, the last of the Penitent Brothers at San Mateo in New Mexico in the Passion Week torture themselves in the most revolting fashion by crucifixion, whipping, and the binding of huge cactuses on their backs. By hideous tortures they expiate in one week their many heinous sins of the whole year. Just as the suggestion that disease is an illusion may conceal pain, for those who give up everything else for healing, so does the suggestion of infinite pleasure conceal for a time the most exquisite pain. But as in the one case, the disease goes on unchecked, so in the others, the wounds of the whip and

the cactus stab remain as realities when the illusion of joy has passed away.

Once men fell at the feet of saints or sprinkled themselves with holy water or vowed their fortunes to charity, to escape the ravages of yellow fever. Later they took quinine, scrubbed the floors, whitewashed the walls, and let sunshine into dark places. Now they hunt mosquitoes, suffocating them in their swamps by gallons of coal oil. Which of all these is the one right way?

"The cell is an illusion," observes Mr. William Q. Judge. "It is merely a word. Thus it is with the body, so it is with the earth, and with the solar system."

"Matter rests on mind. On mind it is dependent for the recognition which is its existence. Its laws are mental channels only, the grooves into which the thought sustaining it naturally falls. With your own mind you can cut such grooves, you can make such laws. Therefore do it! Would you change the law of gravitation? Then change it. You have but to assert yourself. If you have the courage to try, it is nothing to remove mountains."

"When one is troubled by a horrible dream," says another noted sciosophist, "he has only to say: this is a dream. I will awaken. Then the stars shine through the window, and the vision disappears. Thus, as one moves nightmares, so may we remove mountains."

"For there is no Pain in Truth," continues the author last quoted. "Therefore there is no Truth in Pain. There is no Nerve in Mind, therefore no Mind in Nerve. No Matter in Mind, therefore no Mind in Matter. No Matter in Life, therefore no Life in Matter. No Matter in Good, therefore no Good in Matter."

"God is the Principle" of true Science. As there is but one God, there can be but one principle in this Science. As there are many stars, there must be many fixed rules for the demonstration of this Divine Principle. . . . The Equipollence of the Stars above and the Mind below show the awful unreality of Evil!"

In the year 1858, an illiterate peasant girl in the lower Pyrenees, anæmic and neurotic, once saw in the mouth of a cave beside the river in the picturesque little city of Lourdes, a vision of the Virgin Mary, all in white save a blue sash. The vision directed that the cave be made a sanctuary, and that many people should come there to pray.

Since this came into effect, the waters of the cave have healing powers, tested by hundreds every day, with results which have been variously estimated. The societies for promotion bring train-loads of pilgrims, well or ill, from all parts of the neighboring nations, even from places as distant as Lille and Valenciennes, more than 800,000 persons per year coming to the cave in a single summer.

The method pursued, as seen by the present writer, is thus described by an observer (G. Marès), whose account in French I here translate:

"A priest is in the pulpit. . . . The songs alternate with the prayers, which are cut short by brusque supplications, uttered often with the tone of orders, 'Seigneur, sauvez nos malades!' or by tender invocations, 'Seigneur, ayez pitié de nous!' With a gesture, a word, a sign, the preacher enforces obedience on the immense company. 'Les bras en croix!' 'Agenouillez-vous,' 'Prosternez-vous!' 'Baisez la terre!' And then the arms are raised, the knees are bent, the foreheads bowed, the lips touch the earth. In this time, the porters for the men, the sisters of charity for the women, undress the patients and plunge them into the icy waters of the bathing pools. During the bath the prayers continue, warmer, more eager, louder and higher in pitch, as though forcing Heaven to cast down a miracle. Then a man, a woman, a child, falls down crying: 'Je suis guéri! Je suis guérie.' Then the 'Magnificat' rings out, sung by ten thousand voices. While helped forward by the assistants, the one thus healed goes to the 'bureau of constatation,' where the physicians question him, feel his pulse, hear his breathing, and decide whether this is a complete cure, an amelioration, or simply forgetfulness of pain under the excitement of a passing wave of feeling."

The actual miracles, it is claimed by a resident

physician, amount to about one per week, and collections are made for the relief of the "incurables."

Cesare Lombroso, writing of the operations of Madame Eusapia Paladino, claims that "in the psychological atmosphere of the medium in a trance and by the medium's own action, the conditions of matter are modified. Just as if the space in which the phenomenon takes place belonged not to three, but to four, dimensions in which . . . the law of gravity and the law of the impenetrability of matter should suddenly fail, and the laws that rule time and space should suddenly cease, so that a body from a far-off point may all at once find itself near by, and you may find a bunch of freshest flowers in your coat pocket without their showing any trace of being spoiled."

"Let us not be deceived by appearances," says the occultist D'Assier. "Let us be on our guard that, in exploring the shades, we may not take a shade of reasoning for reasoning itself."

It is said that "Logic as well as Magic has its Phantasmal Double, and when Truth dips wearily under oblique suns, the two are apt to range very far apart."

When an electric current, whatever that may be, is passed through a glass tube from which most of the air has been exhausted, various peculiar phenomena are shown. There is an appearance of bluish light, and from certain parts of the apparatus peculiar rays are given off which do not

appear as rays at all. Ordinary light rays pass readily through water, glass or crystal, and we call these objects transparent. Through wood or cloth or stone they will not pass; hence these objects are said to be opaque. And the rays of light may be diverted from their course by passing at an angle from one transparent body to another. This property, known as refraction, is the cause of the formation of images by convex transparent bodies or lenses. But, strangely, the rays of light above mentioned do not act like ordinary light. All objects are transparent to them, though not in equal degree. Not being stopped by dense bodies they are not refracted. Not being affected by lenses, they do not produce vision in the eye. As we cannot see them, to the eye they are not light. But their effect on chemical decomposition is the same as that of light. Hence, while not available for vision, they can be used in photography. But not being refracted, they produce no definite image on the sensitive plate. But they may give rise to shadows. They do not pass through all opaque objects with equal readiness. Hence to place an opaque body between the rays and a sensitized plate would be to cast some kind of a shadow on that plate. The shadow means an arrest of the chemical changes which are the basis of photography. Then, if the opaque body be not in all parts of equal density, the shadow becomes deeper in some places than in others. This gives on the photo-

graphic plate some idea of the intimate nature of the object photographed. For the density is not merely a matter of the surface of bodies. It pertains to the interior, which in an opaque object cannot be seen, but which nevertheless may be photographed in this fashion by these peculiar rays.

This line of investigation was lately developed in experiment by Professor Röntgen, and the strange character of the "X-rays" or "cathode rays" is now a matter known to every one. By means of these non-refracting rays, shadow photographs can be made, showing the bones of the skeleton, imbedded bullets, the contents of a pocket-book, or any similar hidden object which has a nature or a density unlike that of its containing surface. These experiments of Röntgen have been varied and verified in every conceivable way. A wonderful mythology is growing up around them, to the confusion of those who have not paid attention to the series of experiments which made Röntgen's discoveries simple and inevitable.

For example, in a thousand places the Röntgen rays and the bacilli of disease are made to work together to fill the purse of the enterprising physician. The doctor examines the internal organs of the patient with the fluorescent tubes. He finds out how and where the germs of disease are working their devastation. Then he turns the mysterious X-rays upon these germs and they are checked in their career of ruin: shrivelled up, it may be, under

this marvelous light, as caterpillars shrivel on a hot shovel. Another physician distributes his remedies by electric wire, one end in the bottle and the other in the mouth of the patient, miles away. Still other physicians, wise in their generation, use the X-rays and the microbes and the electric currents with other mysterious agencies equally for their own profit or comfort. Now that the X-rays have become somewhat familiar and matter of course, the still more wonderful emanations of radium are made to do the same things and, in a fashion, equally regardless of the lessons of chemistry and of physiology. The medicine man of the Modocs by other incantations of his own calls up the microbe of disease, which he finally spits out, a trout perhaps, or a wood-boring grub, or a small lizard—from his own mouth. There have been occult and esoteric methods in medicine since the first Old Man of the Mountains learned to look wise. The rabbit's foot for good luck, the cold potato for rheumatism, celery for the nerves, and sarsaparilla for the blood, are typical methods as old as humanity. But quackery and pretense do not diminish our debt to honest medicine and surgery, however much it may tend to obscure it.

Some one asked Dr. Mesmer, the great apostle of animal magnetism, which was the form taken by "faith cure" in the last century, why he ordered his patient to bathe in river water rather than in well-water. His answer was that "the river water

was exposed to the sun's rays." When further asked what effect sunshine had other than to warm the water, he replied: "Dear doctor, the reason why all water exposed to the rays of the sun is superior to other water is because it is magnetized—since twenty years ago I magnetized the sun!"

Benjamin Franklin, writing in praise of life in the open air, once said:

"It is recorded of Methusalem, who, being the longest liver, may be supposed to have best preserved his health, that he slept always in the open air; for when he had lived five hundred years an angel said to him: 'Arise, Methusalem, and build thee an house, for thou shalt live five hundred years longer.' But Methusalem answered and said: 'If I am to live but five hundred years longer it is not worth while to build me a house; I will sleep in the air as I have been used to do.'"

A critic said that nowhere in the sacred records could this narration be found. An obvious rejoinder was that this did not matter, if the story was true. Was the story true? And does it matter?

Through the Middle Ages experimenters of all grades were engaged in the task of finding the means by which base metals could be transmuted into gold. It was possible in the chemical laboratory to do many things which seemed equally difficult, and, to the common mind, far more mysterious. In the philosophy of the day, and, perhaps, in

our own time as well, there was every reason to believe that the transmutation of metals was possible. But it never was accomplished, and many a learned alchemist went to his grave, the work of his life a confessed failure.

Yet this very day, the daily press gives the record of successful alchemy. One famous metallurgist of world-wide reputation (all these men have a "world-wide reputation" with one another) has subjected silver to great pressure till it becomes yellow, soft, and heavy, just like gold. All the difference is in the density—16 to 1. Condensed silver is gold, so the newspaper maintains, and the problem of alchemy is solved at last. By these experiments six ounces of silver make but four ounces of gold, one-third of the substance being somehow lost in the process. But with improved appliances the third should be saved and the finances of the world may be reconstructed on a basis of genuine bimetallism, gold being made when wanted from the condensation of silver. Yet all-important as this discovery should be, neither chemistry nor finance pays any attention to it. Wall Street is not disturbed by shadows; neither is science. Common sense demands that the experiments be verified and the steps which led to them be made known before considering for a moment the probability that there is any truth in a wandering rumor of the daily papers.

A writer on the fruitful topic of Reincarnation

has traced the ego or soul of Alexander the Great, from its first incarnation in the wilds of Tartary, to the Jewish adept, called Jeusu, thence to Alexander, Alaric, Charlemagne, Edward the Black Prince, Henry VIII, a Cornish fisherman, an African King, a Staten Island carpenter, a Harvard Senior, and an explorer in the Pennine Alps. His soul, ripening in 1893, had reached to a hermit guide in the Adirondacks, thirty generations in all from crudity to relative perfection, with "but one necessary experience, that of womanhood, yet to undergo."

"Up to a certain point," continues this investigator, "souls develop as wild vegetation does, by the action of laws, external and internal, and their own inherent instincts. Then, as a gardener takes a wild crab-tree, prunes, cultivates, trains, nourishes, plants its seeds in different soils, until he has a fine fruit, good for human use, so the gods take a soul and prune it until it is fit to nourish by example and precept the souls of other men, and to pass by our earth to other planets.

The soul of Alexander, on leaving the body of Henry VIII, passed under the immediate care of the gods, and the fourth stage of its existence began the phase of purification. For as fruit may rot because of too much sunshine, so may soul. And all rot must be purged away." But a leaf rots, through the life and energy of its concealed bacteria. Nothing, as we now believe, can decay

of its own force. Can there be bacilli hidden in the tissues of reincarnated souls? Is the hypothesis of souls rotting too vague and too remote, therefore from verifiability to be considered as a serious hypothesis at all? Perhaps the above instance may remind us, that one of the most prolific sources of error lies in the confusion of analogy with homology, of fleeting or incidental resemblance with fundamental identity. Because a certain likeness in form or function may appear, it is inferred that like similarities may exist in those matters which do not appear. Such reasoning forms a large part of most discussions of politics and theology. It is likewise not unknown in science. For example, a well-known investigator writes from the University of Cambridge:

"Inert matter has in truth more life than has been ascribed to it. It is by a process of sifting out, or, in other words, by Natural Selection, that life, as we know it, has been evolved. The evolution is in the assortment of monads. The tendency throughout nature is towards harmony, but there does not seem to have been pre-established harmony. Nay, rather, everything seems to have been higgledy-piggledy, and to be gradually settling down. When there is harmony among monads there is good; when there is discord there is evil."

"If you will carry the left hind foot of a rabbit in your lower vest pocket, you will have luck all your days." When the Klondyke fever was at its

height, Dr. Fletcher B. Dresslar tells us, "a miner wrote back to his father in this wise: 'If you and the boys can kill any rabbits up in the hills send the feet to me, and I will dispose of the lot in round figures. I never saw men try to press their luck as they do here. A gambler arrived from St. Louis over the Dalton trail, and, knowing that he would find other gamblers, he brought along a dozen rabbits' feet, and sold out the lot for \$50 each.'" The belief in the luck of a rabbit's foot goes with this ancient maxim: "When cold chills run down your back, it means that a rabbit is silently running over your grave."

One Sunday a gambler at Monte Carlo found his way to the English Church in the vicinity, and upon hearing the number of the hymn announced, was "impressed with the feeling" that this was a "lucky number" to bet on, and immediately left the church for the gambling table. He staked heavily on this number and won. Following up the suggestion, he went to church the next Sunday and remained long enough to get the number of the hymn announced, staked on it, and won again. Upon confiding the secret of his success to his friends, they, too, went to church. The contagion spread, until the exodus after the hymn became so marked that the rector was painfully conscious of it, and, on learning of the cause, took occasion to protect himself, and the good name of his church, by announcing from his pulpit that in the

future no hymn whose number was less than 37 would be selected. This number was designated because on the roulette table the highest number is 36. But the strangest and most interesting thing about this story is the fact that it is a true story.

"Superstitions," says Dr. Dresslar, "represent in part those conclusions men have adopted to free the mind from the strain of uncompleted thinking. Men are naturally driven to conclusions regarding the meaning and significance of those phenomena which appear in their minds. There is no physiological or psychological equilibrium unless the mind comes to rest in a conclusion. It is physically and mentally very tiring to hold in the mind a series of conditions, and at the same time to prevent them from shooting together into some sort of a dénouement. The untrained and instinctive mind reaches conclusions quickly, for this is temporarily the line of least resistance. . . . It may accept the generalizations passed down to it by tradition, for it is easier to accept an explanation authoritatively given, than to frame one.

"Nothing will rid humanity of superstition but education. And this education must not stop short of the habit of scientific method and scientific feeling. A student at work in the laboratory learns soon that Nature tells no falsehood and that her laws are inexorable. The scientific worker nowhere has any use for the conception of luck, and so acquires the habit of disregarding all such superstitions."

Man must learn, as Emerson tells us, that 'Every thing in nature, even motes and feathers, go by law and not by luck, and that what he sows, he reaps.'

Dr. Dresslar closes a wholesome chapter on Superstition and Education with these words: "We sometimes flatter ourselves that we have attained almost unto freedom. But I think even a short study of the superstitious tendencies prevalent to-day will convince the most enthusiastic that we are in no little measure still slaves to the unreason of our uncivilized ancestry. And we shall never attain unto rational living until we are regenerated through the gospel of truthful learning; until we acquire the habit of fearless investigation, persistent thinking, and courageous belief." In a similar vein, Dr. Charles Sedgwick Minot assures us that "the only important difference between the practical doctor and the scientific doctor is that the patients of the practical doctor are more likely to die." In saving bodies, and even souls, the essential thing is to know how.

But amid all the wonders of science, non-science, dreaming, fraud and insanity and pretense, how shall the common man find his way? How shall he recognize the claims of truth among all the other voices and noises in this vociferous world? Is not this the answer of science, the answer of common sense? As to many things the common man may not know the whole truth; as to many he perhaps need not know anything whatever. Where he is not concerned in any way so that error and truth are

alike to him, because they cannot affect his action, he may be powerless to decide. It is not important that he should decide. "I do not know" is the affirmation characteristic of the wise man. "Never be afraid to say I do not know," was a favorite admonition of Professor Agassiz. It is safe to believe mildly in mahatmas and norns, in hoodoos and voodooes, if one does not regulate his life according to this belief. The vague unverified faith in protoplasm, in natural selection, or in microbes which the average man possesses, will serve him no better so long as it remains vague and, therefore, unverifiable in distinct sense. The difference appears when one acts upon his belief. The nearer one's acquaintance with molecules or protoplasm, the more real and more natural do they appear. The soundness of our knowledge is tested by the results of our dealings with these things. The microbe is as authentic as the cabbage to one engaged in dealing with it. Protoplasm is as tangible as wheat or molasses. It is possible to make these hypotheses progressively more definite, and hence to verify them. But the astral body and the telepathic impulse become the more vague the nearer we approach them; as ideas or conceptions they import no definite and identifiable consequences to the promise of which they stand committed, and action in pursuance of them can consequently never test their truth. They are irresponsible figments of the fancy, and their names serve only as a cover for our ignorance of the facts.

The charm of such words as Karma, Kismet, and Avatar lies in the fact that most of those who use them have no idea of what they mean. This is the attraction of Nirvana and Devachan. If we know not what such words mean "in terms of life," then they have no meaning. Not being verifiable, they are mere words, and not ideas.

Scientific induction, in its essence, is simply common sense. The homely maxims of human experience are the beginnings of science. To know enough "to come in when it rains" is to know something of the science of meteorology. By scanning the clouds we may know how to come in before it rains. By observing the winds we may tell what clouds are coming. By studying the barometer we may know from what quarter winds and clouds may be expected.

The discoveries of science are made by steps which are perfectly simple to those trained to follow them. No discovery is made by chance in our day. None come to contradict existing laws or to discredit existing knowledge. The whole of no phenomenon is known to man. The whole of any truth can never be. We cannot reach truth regarding the framework of things, unless a part of this framework enters into our human experience. Science deals with human contact and interest. The unknown surrounds on all sides all knowledge in man's possession. The beginning, the end, and the ramifications are beyond his reach. He was not present

when the foundations of the universe were laid. He may not be present when they are dissolved. But scientific knowledge, though limited, is practical and positive so far as it goes. Its criterion is experiment and observation. Every step in observation, experiment, or induction, has been tested by thousands of bright minds, and this testing has been possible because at each step the effort was made to formulate clearly in advance just what the experiment or observation should look for. He is already a master in science who can suggest even one new experiment, because an experiment requires an antecedent, intelligent question by which the results of the experiment may be measured. There is nothing occult or uncanny in scientific methods. The "magic wand" which creates new species of horses or cattle lies in the hand of any stock-breeder. The magic key of the electrician, by which the foam of the cataract becomes the light of the city, may be held by any city council.

To take the illustrations given above: "there is such a thing as a squash," because the assumption that the squash exists constitutes a safe basis for action. On that hypothesis you can plant squashes or raise squashes or make them into pies, and this is the sort of thing we mean when we say the squash exists. The brightness of the brandy-colored world we cannot trust. It requires no scientific instruments of precision to record the failure of the man who guides his life on a basis of impressions

made by drugs or stimulants. The transit of Venus is no product of fancy. To the astronomer the coming of the planet between the earth and the sun is as certain a thing as the coming of the earth into its own shadow at night. The one incident is less common than the other, but not more mysterious. And to go to that part of the earth which is turned toward the sun at the moment of transit is the simple common-sense thing to do if one wishes to see the transit; to predict a transit is, for the scientist, to predict that at some certain time and place it will be visible. The island, the abandoned hut, and the cooking utensils were only incidents to the astronomer. To the natives these were the only realities, and the purposes of science were to them unknown and absurd. To the man of common sense the digging for treasure under the direction of clairvoyants seems ridiculous. The operation does not become more wise when we see it through the eye of science, for the clairvoyant cannot forecast his "probable error" from his knowledge of the function he professes to exercise; he promises "treasure," but he does not say how much or at what precise spot, and, accordingly, even if treasure is found, we are justified in our refusal to admit that he had any actual knowledge of it.

The spectroscope, on the other hand, grows more real and more potent as we study its methods and results. The process of weighing planets is open to all who will continue their studies till they understand it. The test of knowing is doing—doing

something definite and getting thereby results sensibly satisfactorily identical with those which our supposed knowledge clearly and unequivocally predicted at the outset. The oceanic cable is in the service of all who have concerns in another continent. The phenomena of telepathy have fled before every attempt at experiment. The study of X-rays is as far from occultism or spiritism as the manufacture of brass is from the incarnation of mahatmas. The mind healer, the faith healer, the cure of disease by pious negation, the sale of the patent medicine, the medical marvels of radium, the wonders of the electric belt, the power of animal magnetism (malicious or benign), are all witnesses of the potency of suggestion in the untrained mind. To the same class of phenomena the witch-hazel rod belongs. Experiment seems to show that its movements are due to involuntary muscular contractions, and that these follow simply the preconceived notions of the holder of the rod.*

* Bennet H. Brough (London, 1892) gives the following interesting quotations regarding the divining rod:

Theophilus Albinus (Dresden, 1794) says: "I ween that no more confounded thing is to be found in the world than this divining rod business. . . . For evil and lying dealing is best hidden amid this confusion; and in the muddiest water, rascality likes best to fish."—William Hooson (London, 1747) says: "The dignified author of this invention was a German, and at the last he was deservedly hanged for the Cheat."—Says Dr. Rossiter Raymond (1883): "In itself" the divining rod "is nothing. Its claims to virtues derived from the Deity, from Satan, from affinities and sympathies,

Not long since a sciosophist proposed the theory that the chemical elements were each of them forms of "latent oxygen." That this theory is without meaning did not disturb its author. His argument was that the business of science was to propose all sorts of theories. As some apples on a tree will be sound so some theories will be true. To make every conceivable conjecture is the way to hit on the truth. His guess is that gold and hydrogen are alike latent oxygen. Some such notion as to scientific theories is common among cultured people of all countries. To accept it is to ignore the whole history of science. No advance in real knowledge has come from guessing, or dreaming, or speculating, unless guesses or speculations have been based on previous experience, and unless evidence in each case is amenable to the test of action, and have been submitted to it. If we want a picture taken we find a man who has a camera, and who knows how to use it. If we want the truth on any subject we must find a man who understands our questions, who has the instruments or methods of precision, and who knows how to use them. There is no other way. As well expect a man without a

from corpuscular effluvia, from electric currents, from passive perturbatory qualities of organo-electric force are hopelessly collapsed and discarded. A whole library of learned rubbish which remains to us furnishes jargon for charlatans, marvelous tales for fools, and amusement for antiquarians."—"The first divination," observes Voltaire, "took place when the first knave met the first fool!"

camera and who knows not how to use it if he had one, to take a photograph, as to trust to a logically irresponsible speculator, guesser, or dreamer, to find out any truth. To work without tools in the world of objective reality, can yield only error and confusion. There is no way to a just conception of any part of the universe, except to gather the realities relevant to our needs and interests, to compare and consider these facts thus gathered, to set them in order, and to verify in action whatever theory may seem to arise from their relations.

V

REALITY AND EDUCATION

"Life, like a dome of many-colored glass,
Stains the white radiance of Eternity."

—SHELLEY.

IF realities find their test and verification in action, if knowledge finds its function in the conduct of life, these principles should find large application in the field of Education. In youth, this need of direct contact with truth should be the justification for nature-study. In manhood, this should be the inspiration of scientific research.

In the present chapter I wish to discuss the natural relation of nature-study to early education. By nature-study in this sense I do not mean the reading of clever tales of birds and beasts, still less sentimental essays on their beauty, their perfection, or the divine purpose they serve in the economy of nature. Nor yet do I mean premature efforts at classification, the learning of scientific names, or the names of their varied organs under dissection. My plea is for the large open-air contact of children with things as they are, the heritage of every well-nurtured farm-boy, of every child who has stood on his feet in the presence

of natural objects. To be as a "part and parcel of nature," to act as a natural person among natural objects, is the aim of nature-study as thus conceived. I shall try not to overstate the case, nor to claim for such study any occult or exclusive power. It is not for us to say so much nature-study in the schools, so much wisdom and so much virtue in the scholars. Moreover, the character of the teacher is the largest factor in the matter. But the best teacher is the one who comes nearest to nature—the one most effective in promoting individual wisdom.

To seek knowledge is better than to accept it ready-made. To do something with it is better than to hold it. Precepts of virtue are useless unless they can be built into life. With the dawn of prenatal life, "the gate of gifts is closed." We can get nothing more. We can only adjust, arrange, employ what we have. It is the art of life, out of variant and contradictory materials passed down to us from our ancestors, to build up coherent and effective individual character.

The essence of character-building lies in action. The chief value of nature-study in character-building is that, like life itself, it deals with realities. The experience of living is itself a form of nature-study. One must in life make his own observations, frame his own inductions, and apply them in action as he goes along. The habit of finding out the best thing to do next, and then doing it, is the basis of character. A strong character is built up by doing, not by imi-

tation, nor by feeling, nor by suggestion. Nature-study, if it be genuine, is essentially doing. This is the basis of its effectiveness as a moral agent. To deal with truth is necessary if we are to know truth when we see it in action. To know truth precedes all sound morality. There is a great impulse to virtue in knowing something well. To know it well is to come into direct contact with its facts or laws, to feel that its qualities and forces are inevitable. To do this is the essence of nature-study in all its forms.

The rocks and shells, the frogs and lilies, always tell the actual truth so far as it goes. They give clear and decisive answers to distinct and clear questions. Their relations to our lives are such that the child can be led to ask concerning them simple and definite questions which shall at the same time be of vital interest to him. Thus, through commerce with them, he can learn how rightly to know. Associations with these, under right direction, will build up a habit of truthfulness, for nature is always truthful. She teaches truth from original documents. Every leaf on the tree is an original document in botany. When a thousand are used, or used up, the archives of nature are just as full as ever.

From their intimate affinity with the problems of life, the problems of nature-study derive especial value. Because life deals with realities, the visible agents of the overmastering fates, it is well that our children should study the real, rather than the con-

ventional. Let them come in contact with the inevitable, instead of the "made-up," with laws and forces which can be traced in objects and forms actually before them, rather than with those which seem arbitrary or which remain inscrutable. To use concrete illustrations: there is a greater moral value as well as a more easily available educative value in the study of magnets than in the distinction between shall and will, in the study of birds or rocks than in that of diacritical marks or postage stamps, in the development of a frog than in the longer or shorter catechism, in the study of things than in the study of abstractions. There is doubtless a law underlying abstractions and conventionalities, a law of catechisms, but it does not so readily appear to the student, nor so promptly lay hold upon his interest. Its consideration, therefore, does not so effectively strengthen his impression of inevitable truth. There is the greatest moral value, as well as intellectual value, in the independence that comes from knowing, and knowing that one knows and why he knows. Such knowledge gives backbone to character. Learning to know what is right and why it is right, through doing it, and for the sake of doing it, is the basis of character.

The nervous system of the animal or the man is essentially a device to make action effective and to keep it safe. The animal is a machine in action. Toward the end of motion all other mental processes tend. All functions of the brain, all forms of nerve

impulse, are modifications of the simple reflex action, the automatic transfer of sensations gathered from external objects into movements of the body.

The sensory nerves furnish the animal or man at his demand all knowledge of the external world. The brain, sitting in darkness, as it were, judges these sensations, and sends out corresponding impulses to action. The sensory nerves are the brain's sole teachers, but for them it would continue to sit in darkness. The motor nerves, and, through them, the muscles are the brain's only servants. The untrained brain, the brain that does not know how to ask questions, nor when it has received answers, learns its lessons poorly, and its commands are vacillating and ineffective. The brain which has been misused, shows its defects in ill-chosen actions. The great argument for temperance rests on this; all nerve-tampering causes the nerves to lie; a lying brain means unbalanced action.

The senses are intensely practical in their relation to life. The processes of natural selection make and keep them so. Only those phases of reality which our ancestors could render into action are shown to us by our senses. These senses tell us superficial but essential truth about rocks and trees, food and shelter, friends and enemies. They answer no problem in chemistry. They say nothing about atom or molecule. They give us no ultimate facts. Whatever was so small that our ancestors could not handle it is too small for us now to see.

Whatever is too distant to be reached is not truthfully reported. The "X-rays" of light we cannot see, because our ancestors could not deal with them. The sun and stars, the clouds and the sky, are more extended than they appear to be. Our sensitiveness fails as the square of the distance increases. Were our nervous systems to become suddenly receptive to all forms of truth we should be smothered by the inrush of sensations. We should be overwhelmed by the multiplicity and the intensity of our own emotions. Truth-establishing response in action would become impossible. Our questionings of nature would be answered in a strange and sudden din of Babel, and no longer in a fitting and familiar tongue. Hyperesthesia, or abnormal susceptibility, in any or all of the senses is a source of confusion, not of strength. It is essentially a phase of nerve-disorder, and it shows itself in ineffectiveness, not in increased power.

Besides immediate sense-perceptions, the so-called realities, the brain retains also traces of the perceptions which have been impressed upon it in the past, and which are not wholly lost. Memory-pictures crowd the mind, mingling with pictures which are brought in afresh by the senses. The force of suggestion causes the mental states or conditions of one person to repeat themselves in another. Abnormal conditions of the brain itself furnish another series of feelings with which the brain must deal. Moreover, the brain is charged with impulses to

action passed on from generation to generation, surviving because they are useful. With all these arises the vital necessity for wise choice as a function of the mind. The mind must neglect or suppress all sensations which it cannot weave into action. The dog sees nothing that does not belong to its little world. The man in search of mushrooms "tramples down oak-trees in his walks." To select the sensations that concern us, to keep ourselves aloof from those which do not, is the essence of the power of attention. This power, manifesting itself in the suppression of undesired actions, and in the enforcement of those desired, is called the will. To find data for choice among accessible objects of perception with the corresponding possible motor responses is a function of the intellect. Intellectual persistency based on persistency of interests is the foundation of individual character.

As the conditions of life become more complex, it becomes necessary for action to be more carefully controlled. Wisdom is the parent of virtue. After the stage of verification, knowing what should be done logically precedes doing it. Good impulses and good intentions do not make action right or safe. In the long run, action is tested not by its motives, but by its results.

The child, when he comes into the world, has everything to learn. His nervous system is charged with tendencies to reaction and impulses to motion, which have their origin in survivals from ancestral

demands. Exact knowledge, by which his own actions can be made exact, must come through his own experience. The experience of others must be expressed in terms of his own before it becomes wisdom. Wisdom, to repeat, is knowing what it is best to do next. Virtue is doing it. Doing right becomes a habit, if it is pursued long enough. It becomes a "second nature," or, we may say, a higher heredity. The formation of a higher heredity of wisdom and virtue, of knowing right and doing right, is the chief element of character-building.

The moral character is based on knowing the best, choosing the best, and doing the best. It cannot be built up on imitation alone. By imitation, suggestion, and conventionality the masses are formed and controlled. To build up a man is a nobler process, demanding materials and methods of a higher order. The growth of man is the assertion of individuality. Only robust men can make history. Others may adorn it, disfigure it, or vulgarize it.

The first relation of the child to external things is expressed in this: What can I do with it? What is its relation to me? The perception goes over into thought, the thought into action. Thus the impression of the object is built into the little universe of his mind. The object and the action it implies are closely associated. As more objects are apprehended, more complex relations arise, but the primal condition remains—What can I do with it? Percep-

tion, thought, action—this is the natural sequence of each completed mental process. As volition passes over into action, so does science into art, knowledge into power, wisdom into virtue.

By the study of realities wisdom is built up. In the relations of objects he can touch and move, the child comes to find the limitations of his powers, the laws that govern phenomena, and to which his actions must be in obedience. So long as he deals with realities, these laws stand in their proper relation. "So simple, so natural, so true," says Agassiz. "This is the charm of dealing with Nature herself. She brings us back to absolute truth so often as we wander."

So long as a child is led from one reality to another, never lost in words or in abstractions, so long this natural relation remains. What can I do with it? is the beginning of wisdom. What is it to me? is the basis of personal virtue.

While a child remains about the home of his boyhood, he knows which way is north and which is east. He does not need to orientate himself, because in his short trips he never loses his sense of space direction. But let him take a rapid journey in the cars or in the night, and he may find himself in strange relations. The sun no longer rises in the east, the sense of reality in directions is gone, and it is a painful effort for him to join the new impressions to the old. The process of orientation is a difficult one, and if facing the sunrise in the morn-

ing were a deed of necessity in his religion, this deed would not be accurately performed.

This homely illustration applies to the child. He is taken from his little world of realities, a world in which the sun rises in the east, the dogs bark, the grasshopper leaps, the water falls, and the relations of cause and effect appear plain and natural. In these simple relations moral laws become evident. "The burnt child dreads the fire," and this dread shows itself in action. The child learns what to do next, and to some extent does it. By practice in personal responsibility in little things, he can be led to wisdom in large ones. For the power to do great things in the moral world comes from doing the right in small things. It is not often that a man who really knows that there is a right does the wrong. Men who do wrong are either ignorant that there is a right, or else they have failed in their orientation and look upon right as wrong. It is the clinching of good purposes with good actions that makes the man. This is the higher heredity that is not the gift of father or mother, but is the man's own work on himself.

The impression of realities is the basis of sound morals as well as of sound judgment. By adding near things to near, the child grows in knowledge. "Knowledge set in order" is science. Nature-study is the beginning of science. It is the science of the child. To the child, training in methods of acquiring knowledge is more valuable than knowl-

edge itself. In general, throughout life sound methods are more valuable than sound information. Self-direction is more important than innocence. The fool may be innocent. Only the sane and the wise can be virtuous.

It is the function of science to make our knowledge of the small, the distant, the invisible, the mysterious as accurate as our knowledge of the common things men have handled for ages. It seeks to make our knowledge of common things exact and precise, that exactness and precision may be translated into action. The ultimate end of science, as well as its initial impulse, is the regulation of human conduct. To make right action possible and prevalent is the function of science. The "world as it is" must be the ultimate inspiration of art, poetry, and religion. The world, as men have agreed to say it is, is quite another matter. The less our children hear of this, the less they will have to unlearn in their future development.

When a child is taken from nature to the schools, he is usually brought into an atmosphere of conventionality. Here he is not to do, but to imitate; not to see, nor to handle, nor to create, but to remember. He is, moreover, to remember not his own realities, but the written or spoken ideas of others. He is dragged through a wilderness of grammar, with thickets of diacritical marks, into the desert of metaphysics. He is taught to do right, not because right action is in the nature of

things, the nature of himself, and the things about him, but because he will be punished somehow if he does not. He is given a medley of words without ideas. He is taught declensions and conjugations without number in his own and other tongues. He learns things easily by rote; so his teachers fill him with rote-learning. Hence grammar and language have become stereotyped as teaching without a thought as to whether undigested words may be intellectual poison. And as the good heart depends on the good brain, undigested ideas may become moral poison as well. No one can tell how much of the intellectual and moral discomfort of the schools has been due to intellectual dyspepsia from undigested words.

In such manner the child is bound to lose his orientation as to the forces which surround him. If he does not recover it, he will spend his life in a world of unused fancies and realities. Nonsense will seem half truth, and his appreciation of truth will be vitiated by lack of clearness of definition—by its close relation to nonsense. That this is no slight defect can be shown in every community. There is no intellectual craze so absurd as not to have a following among educated men and women. There is no scheme for the renovation of the social order so silly that educated men will not invest their money in it. There is no medical fraud so shameless that educated men will not give it their certificate. There is no nonsense so unscientific

that men called educated will not accept it as science.

It should be a function of the schools to build up common sense. Folly should be crowded out of the schools. We have furnished costly asylums for its accommodation. That our schools are in a degree responsible for current follies, there can be no doubt. We have many teachers who have never seen truth in their lives. There are many who have never felt the impact of an idea. There are many who have lost their own orientation in their youth, and who have never since been able to point out the sunrise to others. "Three roots bear up Dominion—Knowledge, Will, the third Obedience." This statement, which Lowell applies to nations, belongs to the individual man as well. It is written in the structure of his brain—knowledge, volition, action—and all three elements must be sound, if action is to be safe or effective.

But obedience must be active, not passive. The obedience of the lower animals is automatic, and therefore in its limits measurably perfect. Lack of obedience means the extinction of the race. Only the obedient survive, and hence comes about obedience to "sealed orders," obedience by reflex action, in which the will takes little part. In the early stages of human development, the instincts of obedience were dominant. Great among these is the instinct of conventionality, by which each man follows the path others have found safe. The Church and the State, organizations of the strong,

have assumed the direction of the weak. It has often resulted that the wiser this direction, the greater the weakness it was called on to control. The "sealed orders" of human institutions took the place of the automatism of instinct. Against "sealed orders" the individual man has been in constant protest. The "warfare of science" was part of this struggle. The Reformation, the revival of learning, the growth of democracy, are all phases of this great conflict.

The main function of democracy is not good government. If that were all, it would not deserve the efforts spent on it. Better government than any king or congress or democracy has yet given could be had in simpler and cheaper ways. The automatic scheme of competitive examinations would give us better rulers at half the present cost. Even an ordinary intelligence office, or "statesman's employment bureau," would serve us better than conventions and elections. But a people which could be ruled in that way, content to be governed well by forces outside itself, would not be worth the saving. Government too good, as well as too bad, may have a baneful influence on men. Its excellence is a secondary matter. The purpose of self-government is to intensify individual responsibility; to promote attempts at wisdom, through which true wisdom may come at last. Democracy is nature-study on a grand scale. The republic is a huge laboratory of civics, a laboratory in which strange

experiments are performed; but by which, as in other laboratories, wisdom may arise from experience, and, having arisen, may work itself out into virtue.

"The oldest and best-endowed university in the world," Dr. Parkhurst tells us, "is Life itself. Problems tumble easily apart in the field that refuse to give up their secret in the study or even in the closet. Reality is what educates us, and reality never comes so close to us, with all its powers of discipline, as when we encounter it in action. In books we find Truth in black and white; but in the rush of events we see Truth at work. It is only when Truth is busy and we are ourselves mixed up in its activities that we learn to know of how much we are capable, or even the power by which these capabilities can be made over into effect."

Professor Wilbur F. Jackman has well said: "Children always start with imitation, and very few people ever get beyond it. The true moral act, however, is one performed in accordance with a known law that is just as natural as the law which determines which way a stone shall fall. The individual becomes a moral being in the highest sense when he chooses to obey this law by acting in accordance with it." Conventionality is not morality, and may co-exist with vice as well as with virtue. Obedience has little permanence unless it be intelligent obedience, an obedience that finds out, by working it out, its own justification."

It is, of course, true that wrong information may lead sometimes to right action, as falsehood may secure obedience to a natural law which would otherwise have been violated. But in the long run men and nations pay dearly for every illusion they cherish. For every sick man healed at Denver or Lourdes, ten well men may be made sick. The faith cure and the patent medicine feed on the same victim. For every Schlatter who is worshiped as a saint, some equally harmless lunatic will be stoned as a witch. This scientific age is beset by the non-science which its altruism has made safe. The development of the common sense of the people has given security to a vast horde of follies, which would be destroyed in the unchecked competition of life. It is the soundness of our age which has made what we call its decadence possible. It is the under-current of science which has given security to human life, a security which obtains for fools as well as for sages.

For protection against all these follies which so quickly fall into vices, or decay into insanity, we must look to the schools. A sound recognition of cause and effect in human affairs is our best safeguard. The old common sense of the "unhigh-schooled man," aided by instruments of precision, and directed by logic, must be carried over into the schools. Clear thinking and clean acting, we believe, are results of the study of nature. When men have made themselves wise, in the wisdom

which may be completed in action, they have never failed to make themselves good. When men have become wise with the lore of others, the learning which ends in self, and does not spend itself in action, they have been neither virtuous nor happy. "Much learning is a weariness of the flesh." Thought without action ends in intense fatigue of soul, the disgust with all the "sorry scheme of things entire," which is the mark of the unwholesome philosophy of Pessimism. This philosophy finds its condemnation in the fact that it has never yet been translated into pure and helpful life.

With our children, the study of words and abstractions alone may, in its degree, produce the same results. Nature-studies have long been valued as a "means of grace," because they arouse the enthusiasm, the love of work, which belongs to open-eyed youth. The child bored with moral precepts and irregular conjugations turns with delight to the unrolling of ferns and the song of birds. There is a moral training in clearness and tangibility. An occult impulse to vice is hidden in all vagueness and in all teaching meant to be heard, but not to be understood. Carelessness in knowledge leads to carelessness in conduct. Nature is never obscure, never occult, never esoteric. She must be questioned in earnest, else she will not reply. But to every serious question she returns a serious answer. "Simple, natural, and true," should make the impression

of simplicity and truth. Truth and virtue are but opposite sides of the same shield. As leaves pass over into flowers and flowers into fruit, so are wisdom, virtue, and happiness inseparably related.

VI

REALITY AND TRADITION

"In all modern history, interference with science in the supposed interest of religion, no matter how conscientious such interference may have been, has resulted in the direst evils to religion and to science, and invariably. And on the other hand, all untrammelled scientific investigation, no matter how dangerous to religion some of its stages may have seemed for the time, has invariably resulted in the highest good both of religion and of science."—ANDREW DICKSON WHITE.

EACH man is the center of his own world. In his secret heart he believes himself a child of luck. If his affairs go persistently to the bad, he is, in his own estimation at least, persecuted by fortune. He is always in his own foreground, the object of special favor or of special malice. As each individual thus feels himself the object of attention from mysterious unseen powers, so with human society. In all the ages, men have found a mystic or divine warrant for their collective actions, whatever these may be. On this warrant, institutions have been built up. Those institutions that survive gather to themselves an ever-increasing authority. This is a divine warrant so far as it goes. For all such authority must, in the main,

rest on man's needs. There must be reality in these needs, else the institutions would not have so long persisted. Thus, should every fragment of the historic churches of Christendom disappear, every memory, every ceremony, every trace of creed or form, the church would rise again, renewed as to all of its essentials. Around these essentials non-essentials would accumulate, like driftwood on a lee shore. With each variant race of man, there would be a corresponding variation in the external features of the church.

Monarchy, in turn, exists by the same divine right. It is workable in a degree, and thus it persists. By the same divine right it is claimed that the wheelbarrow also persists. This is also workable in its degree and for its own purpose. When monarchy fails, the same divinity that hedged the king sustains the rights of the people. The king was God's anointed, so long as the people were content. But when "God said, 'I am tired of kings, I suffer them no more,'" the self-rule of the people acquired the same divine right. The power belongs to whoever can use it. We know God's purposes only by what he permits. That which exists as if in the nature of things, that which proclaims itself as powerful, men have worshiped as divine. This is especially true if origin and relations have been dimly understood. The force felt in the darkness has been the fittest object of worship. To worship a god built visibly of a block of wood has never ap-

pealed to strong men. It is the hidden force invisible, even in stone, before which men bow.

It has been plain to man in all ages that he is surrounded by forces stronger than himself, invisible and intangible, inscrutable in their real nature, but terribly potent to produce results. As the human will seems capricious because the springs of volition are hidden from observation, so to the unknown will that limits our own we ascribe an infinite caprice. All races of men capable of abstract thought have believed in the existence of something outside themselves whose power is without human limitations. Through the imagination of poets the forces of nature become personified. In primitive logic the existence of power demands corresponding will. The power is infinitely greater than ours; the sources of its action inscrutable; hence man has conceived the unknown first cause as an infinite and unconditioned man. Anthropomorphism in some degree is inevitable, because each man must think in terms of his own experience. Into his own personal universe, all that he knows must come. Recognition of the hidden but gigantic forces in nature leads men to fear and to worship them. To think of them either in fear or in worship is to give them human forms. About the perceptions of things formed in his own brain, each man builds up his own subjective or self-centered universe. Each accretion of knowledge must be cast more or less directly in terms of previous experience. By proc-

esses of suggestion and conventionality the ideas of the individual become assimilated to those of the multitude. Men are gregarious creatures, and their speech gives them the power to add to their own individual experiences the concepts and experiences of others. Suggestion and conventionality play a large part in the mental equipment of the individual man. Thus myths arise to account for phenomena not clearly within the ordinary experiences of life. And in all mythology the unknown is ascribed not to natural forces, but to the quasi-personal action of powers that transcend nature, powers that lie outside the domain of the familiar and the real.

Primitive man finds this interpretation satisfactory, and he holds it as true. Cause and effect for him are conceptions of vaguely personal influence and personal response. His interests, his undertakings, his imaginings, and hopes, slowly and uncertainly develop to a form and magnitude which these conceptions cannot manage. When man can no longer accept the answers which the use of these conceptions brings the age of science has set in. It is the mission of science—so far as it goes—to place man in more and more satisfactory working relations with the real nature of the universe. By methods of precision of thought and by instruments of precision of observation and experiment, science seeks to make our knowledge of the small, the distant, the invisible, the mysterious, the mighty, as accurate, as practical, as our knowledge of common

things. Moreover, it seeks to make our knowledge of common things also accurate and precise, that this accuracy and precision may be translated into more effective action. For the ultimate end of science as well as its initial impulse is the regulation of human conduct. Seeing true means thinking right. Right thinking means right action. Greater precision in action makes higher civilization possible.

But the progress of science is slow. It must overcome powerful resistance. The social instincts of primitive man tend to crystallize in institutions even his common hopes and fears. An institution implies a division of labor. Hence, in each age and in each race men have set apart certain of their fellows as representatives of these hidden forces, devoted them to the propitiation of these forces. These men are thus commissioned to speak in the name of each god that the people worship, or of each demon the people dread. The existence of each cult of priests is bound up in the perpetuation of the mysteries and traditions assigned to its care. These traditions are linked with other traditions and with other mystic explanations of uncomprehended phenomena. While human theories of the sun, the stars, the clouds, of earthquakes, storms, comets, and disease, have no direct relation to the feeling of worship, they cannot be disentangled from it. The uncomprehended, the unfamiliar, and the supernatural are one and the same in the untrained

human mind; and one set of prejudices cannot be dissociated from the others.

To the ideas acquired in youth we attach a sort of sacredness. For the course of action we follow we are prone to claim some kind of mystic sanction; and this mystic sanction applies not only to acts of virtue and devotion, but to the most unimportant rites and ceremonies. In these we resent changes with the full force of such conservatism as we possess. New ideas, without the sanction of tradition, whatever the nature of their source, must struggle for acceptance. To the scientific notions of our childhood we cling with special persistence, because they are associated with our conception of right doing and of the motives which control it. Both are part of the mental universe we built around us in our youth, and one in which we would not willingly make changes or extensions. Much that we have called religion is merely the débris of our grandfather's science.

In history the struggle of knowledge drawn from present and significant realities, against tradition and prejudice drawn from past realities, has assumed the form of a war of science with religion. Not that religion is bound up in the preservation of error, but that men have bolstered up their traditional opinions with the consensus of society, and this fact has appeared as a religious sanction. Thus the history of the progress of knowledge has been a record of physical resistance of organized society

to new ideas drawn from the deeper experience and the bolder aspiration of men. "By the light of burning heretics Christ's bleeding feet I track." He who sees that the world does move is burned at the stake, that other men may be convinced of the earth's stability. He who is sure that granite rock was once melted finds social pressure against him when he would make known the results of his observations. He who would give the sacred books of our civilization the faithful scrutiny their vast importance deserves, finds the doors of libraries and universities closed to his research. He who has seen the relation of man to his brother animals, finds the air filled with the vain chatter of those to whom whatever is natural seems only profane. "Extinguished theologians," Huxley tells us, "lie about the cradle of every science as the strangled snakes beside that of the infant Hercules."

But this, again, is not the whole story. All these are only incidents natural to human development. Not only theologians lie strangled about the cradle of the infant giant, but learned men of all classes and conditions. Learning and wisdom are not identical; they are not always on speaking terms. Learning looks backward to the past. The word "learn" involves the existence of some man as teacher. Wisdom looks forward to the future. In so far as science is genuine, it is of the nature of wisdom. "To come in when it rains" is the beginning of the science of meteorology. "The soul

that sinneth, it shall die," is the practical basis of the science of personal ethics. To be wise is to be ready to act; but learning as such in all the ages has condemned wisdom and despised action.

The development of all science has been a constant struggle, a struggle of reality against superstition, of instant impressions against traditional interpretations, of truth against "make-believe," of investigation against opinion. Investigation once enthroned as science must meet again insurgent opinion, and the recrudescence of ancient folly. For men are prone to trust a theory rather than a fact; a fact is a single point of contact; a theory or a tradition is a circle made of an infinite number of points, none of them, however, it may be, real or permanently significant.

The warfare of science is, however, not primarily, as Draper has called it, a conflict with religion, nor even, as President White would have it, a struggle with "dogmatic theology." It is all of these, but it is more than these—a conflict of tendencies in the human mind which has worked itself out into history. The great crises of history in general are rehearsed in the minds of men before they appear on the stage of the world. This issue is settled in psychology before it appears in history. In the affairs of life most of us, of necessity, perform deeds and recite sentences "written for us generations before we were born." "He hath his exits and his entrances." He is a rare man who can add a new

meaning to his lines or give a better one to him that follows. For it may take a lifetime of the severest labor to find out a new fact. No truth comes to man unless he asks for it. It needs years of patience and devotion to ask a genuinely and radically new question. He is already a master in science who can suggest a new experiment. The history of the progress of science is written in human psychology before it appears in human records. In the mind of the discoverer and in the minds of those who antagonize his discovery, the strife is on. It is the struggle of the few realities or present sense-impressions against the multitude of past impressions, with their suggestions and explanations. The struggle between science and theology has resulted only because theological misconceptions were entangled with crude notions of other sorts. In the experience of a single human life there is little to correct even the crudest of theological conceptions. From the supposed greater importance of religious opinions in determining the fate of men and nations, theological ideas have dominated all others throughout the ages. Therefore, in the nature of things, the great religious bodies have formed the stronghold of conservatism against which the separated bands of science have hurled themselves, long seemingly in vain.

From some phase of the "warfare of science" no individual is exempt. In some one line, at least, every lofty mind throughout the ages has demanded

access to the freedom of objective reality, the right to question in his own way the empirical world of individual real things. More and more through the ages, men in our day have learned to trust a present fact, or group of facts, however contradictory its teachings, as opposed to tradition and opinion. From this increasing trust, keeping pace with the development of men's practical needs and theoretical interests, the great fabric of modern science has been built up. There is no better antidote to bigotry than the study of the growth of knowledge. There is no chapter in history more encouraging than that which treats of the growth of open-mindedness. The study of this history leads religious men to shun intolerance in the present, through a knowledge of the evils intolerance has wrought in the past. Men of science are spurred to more earnest work by the record that through the ages objective truth has been the final test of all theories and conceptions. All men will work more sanely and more effectively as they realize that no good to religion or science comes from trying "to please God with a lie."

The progress of science has been a struggle of thinkers, observers, and experimenters against the dominant forces of society. It has been a continuous battle, in which the side that seems weakest is, in the long run, winner, having the strength of the universe behind. It has been incidentally a conflict of earth-born knowledge with opinions of men

sanctioned by religion; of present fact with pre-established system; visibly a warfare between inductive thought and dogmatic theology. But the real struggle lies deeper than this. It is the effort of the human mind to relate itself to realities in the midst of traditions and superstitions, to realize that Nature never contradicts herself, is always complex, but never mysterious. As a final result all past systems of philosophy, if not all possible systems, have been thrown back into the realm of literature, of poetry. They can no longer dogmatically control the life of action, each forward step of which must take its departure from present aim and present fact. In the warfare of tradition against science the real and timely in act and motive has striven to replace the unreal and the obsolete. Men have very slowly learned that the true glory of life lies in its wise conduct, in the daily act of love and helpfulness, not in the vagaries fostered by the priest nor in the spasms of madness which are the pride of the spirit of war. To live here and now as a man should live constitutes the ethics of science. This ideal has been in constant antithesis to the ethics of ecclesiasticism, of asceticism, and of militarism, as well as to the fancies of the various groups of "intellectual malcontents to whom the progress of science seems slow and laborious."

Science is human experience of contact with real things tested, set in order, and expressed in terms

of other human experience. Utilitarian science is that part of knowledge a man can use in the affairs of life. What is pure science to one may be applied science to another. The investigation of the laws of heredity may be strictly academic to us of the university, but they are rigidly utilitarian as related to the preservation of the nation or to the breeding of pigs.

Pure science and utilitarian science merge into each other at every point. They are one and the same thing in logical framework and in basal conceptions. Every new truth can be used to enlarge human power or to alleviate human suffering. There is no fact so remote as to have no possible bearing on human utility. Applied science is pure science before it is applied. Pure science is pure not in an impossible transcendence of *all* application, but in its impartial availability for *any* desired application. To apply science to human needs is to utilize it as well as to lend it verification. Every new truth of science may fall into the grasp of that higher philanthropy which considers the highest as well as the lowest in the well-being of man. Science is the flower of human altruism. No worker in science can stand alone. None counts for much who tries to do so. He must enter into the work of others. He must fit his thought to theirs. He must stand on the shoulders of the past, if he is to look far into the future. The past has granted its assistance to the fullest degree of the most perfect altruism. The

future will not refuse its own co-operation, and, in return, whatever knowledge it can take for human uses, it will choose in untrammelled freedom. The sole line which sets off utilitarian science lies in the limitation of human strength and of human life. The single life must be given to a narrow field, to a single strand of truth, following it wherever it may lead. Some must teach, some must investigate, some must adapt to human uses. It is not often that these functions can be united in the same individual. It is not necessary that they should be united; for art is long, though life is short, and time is fleeting.

I have said before that in matters not presently vital to action, the exactness and pertinence of knowledge loses its importance. Any tradition, as any other kind of belief, may be safe, if we do not place upon it the weight of action. It is perfectly safe, in the ordinary affairs of life, for one who does not propose to trust himself to his convictions to believe in witches and lucky stones, imps and elves, astral bodies and odic forces. Thus, also, one may believe in the right of the present heir of the Stuarts to the throne of England. He may believe in Feudalism, in the patristic miracles or in the apotheosis of Roman Emperors. It is quite as consistent with ordinary living to accept these as objective realities as it is to have the vague faith in microbes and molecules, mahatmas and protoplasm, protective tariffs and manifest destiny, which

forms part of the mental outfit of the average American citizen of to-day. Unless these conceptions are to be brought into terms of personal experience, unless in some degree we are to trust our lives to them, unless they are to be wrought into action, they are irrelevant to the conduct of life. Unless in some way we propose to act upon them, we are not really holding them as articles of faith. When they are tested by action, the truth in tradition, as in other conception, is separated from the falsehood, and the error involved in antiquated or vague or silly ideas becomes manifest. As one comes to handle microbes, they become as real as bullets or oranges, and as susceptible of being known or measured or photographed. Thus one may test and prove the truth of the lesson of the Book of Job, that of the Ten Commandments, that of the law of eminent domain. But the astral body touches no reality, and ghosts vanish before the electric light.

"The world as it is," or, rather, the world as it is to us, is the province of science. "The God of the things as they are" is the God of the highest heaven. "Of the things as they are" to us, we mean, for we can know no other things, nor any things in any other way. And as, to the sane man, the world, as it is, is glorious, beautiful, harmonious, and divine, so will science more and more rise to be the inspiration of art, of poetry, and of religion. We stand on the threshold of a new century; a century of science; a century whose discoveries of reality

shall far outweigh those of all centuries which have preceded it; a century whose glories even the most conservative of scientific men dare not try to forecast. And this twentieth century is but one—the least, most likely—of the many centuries crowding to take their place in the development of human knowledge. Each century will behold a great increase of precision in each branch of human knowledge, a great widening of the horizon of human thought, a great improvement in the conditions of human life, as enlightened purpose, intelligence, and precision rise to be more and more controlling factors in human action.

The truth we need is the truth we can use in our affairs. The life of action verifies and validates the world of realities. For "we are men" after all, says Fonsegrive, "and not gods. We know the whole of nothing, but we know something. 'Tis but little no doubt, but this little suffices for our purposes."

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